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A REVIEW ON ACTION RETRIEVAL: A BRIEF SURVEY

RUPINDER KAUR[1] MRS. SHEILLY[2]

[1]M.tech Student (CSE), CEC Landran, Mohali, India
[2]Assist. Prof. (CSE), CEC Landran, Mohali, India

ABSTRACT-

With the advancement of the technology the multimedia storage grows day by day.

Large numbers of videos are present over the internet. Along with the development of the storage of multimedia, video retrieval from the database is the important area of the research. Content based retrieval deals with the selection of extracted features for retrieving particular information from the database. Extracted features play the major role in selection, indexing and ranking of the data according to the interest of the user. Time and the space cost features are reduced for efficient working of the retrieval system. This survey deals with the indexing and retrieval of data along with the similarity based measurement.

Keywords- Shot Boundary Detection, Key Frame Extraction, Scene Segmentation, Video Data Mining, Video Classification and Annotation, Similarity Measure, Video Retrieval, Relevance Feedback.

I. INTRODUCTION

Multimedia information system has become the important area of research. That deals with the broadband network, high powered workstations and various compression standards. Visual system requires proper indexing so that the large amount of data can be stored and retrieved from the data base. The process of visual retrieval is same as retrieval of image retrieval. Visual data is stored on the basis of keywords and attributes which helps in indicating or accessing the required visual data from the data base. Standard query language can be used for accessing the visual data from the database, however the use of

SQL for retrieving information require large amount of the manual processing. So researchers have focused on developing the content based indexing and retrieval technologies [1]. Videos are divided into the frames and these key frames are used for indexing and retrieval of the information from the database. Video retrieval has become the important

area of research for retrieving and handling the large amount of data that is present or stored in the database. Process of retrieving the essential information from the large databases is called content based visual reterival.

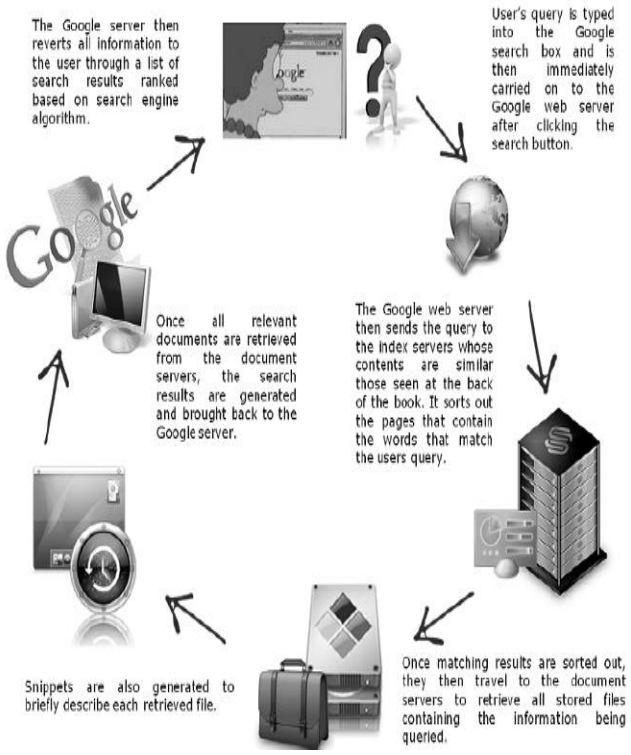

Fig 1. Working of Google search Engine

Figure 1 shows the working of Google search engine. It has been shown that when we want to search a particular information from the search engine. Query is entered in the search box in the form of some image to get the relevant information related to the image. Then the query is forwarded to the server which is connected to the internet. The server searches for the relevant data and then sends back the URL of the desired data based on the tagging of textual words.

However with the advancement of the technology and continuous researchers in this area has made video retrieval easier on the basis of colour, texture, shape, motion and spatial temporal composition features. Since due to inexpensive storage and low cost of digital cameras a large amount of data is present in the unorganized form. Video retrieval has become the important area of research and is the fast growing area of research in the field of multimedia technology. Various techniques such as content based image retrieval (CBIR), query based image content (QBIC) and content based visual retrieval has been developed for the retrieving multimedia data from the large data bases.

II. VIDEO INDEXING AND RETRIEVAL FRAMEWORK

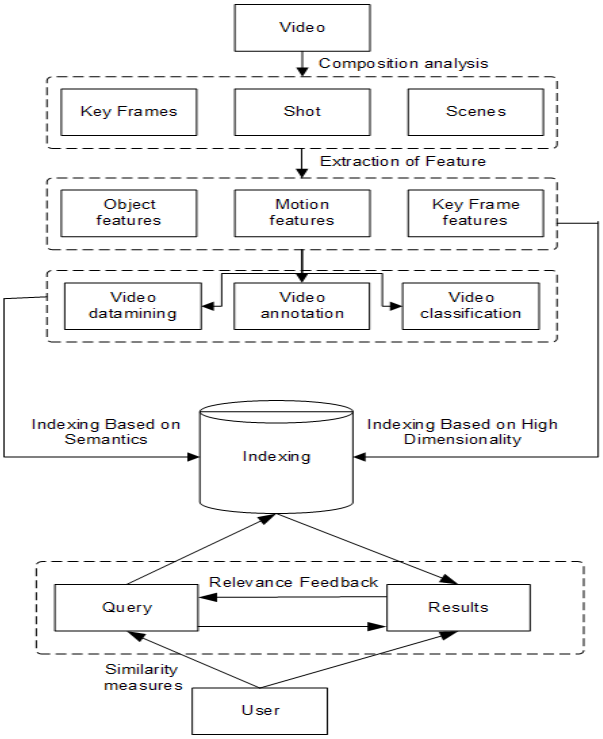

Fig 2. Video indexing and retrieval framework

Figure 2 shows the flowchart about the working of video retrieval system. Various components required and their interaction with the each component is shown in the flowchart. First step is to detect the boundaries, and then extracting the key frames. Second step deals with the segmentation of the video unit on the basis of key frames, motion features and object features from the video sequence. At the third step the video data is taken out on the basis of extracted features. In the fourth step various techniques such as data mining, video annotation and video classification is performed to get the indexing of the similar data from the database. Fifth step deals with indexing of data are performed on the basis of semantics and dimensionality of the data for searching the particular video from the database. Sixth step deals with the feedback of the user according to the results shown by the retrieval system.

III. ANALYSIS OF VIDEO COMPOSITION

Video composes of the scenes which can be further divided into the shots and further frames are achieved by dividing the shots. Hierarchy of the video clip is shown in the figure 3

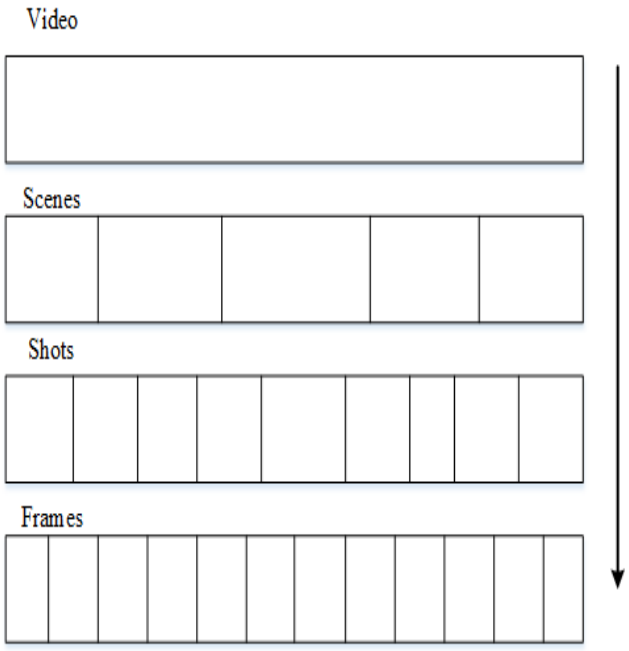

Fig 3. General Hierarchy of Video Parsing

Analysis of video structure deals with the shot boundary detection, key frame extraction, scene segmentation, boundary detection of the shot and extraction of the key frame [3].

A. Shot Boundary Detection

Shots are derived from the video sequence by dividing the video into the various sections. Shot is basically the continuous sequence of frame that is captured from the nonstop camera operations. According to the semantic view the lowest level is frames, then the collection of frames form the shots which is further followed by the scene and then we finally get the whole video sequence. Shot boundaries are derived by dissolving the fades and wipes from the frames to get the gradual transition of the values.

Features are extracted from the each frame and then likeness between frames is checked for detecting the shot boundaries. Boundary detection and classification methods use the global and local features for estimating the transition and errors in the shots. Multilayer perception network are used for classifying the frames according to the no change within the shot frame, abrupt changes within the frame and the gradual changes within the frame.

Shot boundary detection can be classified into two categories Threshold approach and the statistical approach. Threshold approach deals with the detecting the shot boundaries by comparing the pair wise similarity between frames having the predefined threshold. Statistical approach deals with the classification of shots on the basis of the features contained in the shot.

B. Key Frame Extraction

Various features associated with key frame extraction are colours, edges, shapes and optical flow. Key frame extraction can be classified into various categories such as frame extraction on the basis of sequential comparison-based, frame extraction on the basis of global comparison-based, frame extraction on the basis of reference frame-based, frame extraction on the basis of clustering based, frame extraction on the basis of curve simplification-based, and frame extraction on the basis of object/event-based.

Sequential comparison method deals with the extraction of the key frames from the video sequence and then comparison of various key frames is done to get the different frame in the video sequence. Difference of two frames is done by using the colour histogram technique. Global comparison-based deals with the global difference between the various shots of the video by minimizing a predefined objective function. In the Reference frame- based Algorithms, the reference frame is generated to get the key frames by comparing the reference frame with the other frames. Video compression is used to check the rate of the errors in the evaluation of the comparison. Since errors depends on the type of algorithm used for the processing of the data. Thresholds in global base comparison, frame based reference, sequential comparison based, algorithms clustering based along with that the parameters to robust the curves in the simplification based algorithms in the curve these are the examples of the parameters. The parameters are chosen such that it is acceptable to keep such error rate in the algorithm.

C. Scene Segmentation

Scene refers to the groping of the continuous shots that are coherent on the basis of certain subject. Scene segmentation deals with the segmentation of the particular scene of the video sequence. Scene can be segmented on the various basis that are categorized as follows Ocular and aural information

based, Key frame based segmentation and the background based segmentation:

1) Ocular and aural information based: Boundaries of the shots are selected by using the ocular and aural information based approach and at the same time acoustic change is seen in the visual data of the video sequence.

2) Key frame based: combination of the key frames form the shots of the video sequence. Features are grouped temporally in the in the key frame based technique. Drawback of this technique is that it doesn't show the dimensions of all the contents of the shots. As in the video we are concerned with the content of the scene rather than the dimensions.

3) Background Based: This technique deals with the background similarity of the scene. This technique is based on the hypothesis that background remains the same in each shot.

Segmentation techniques of the scene can be categorized into various categories i.e. splitting based segmentation, shot based segmentation and model based segmentation

IV. FEATURE EXTRACTION

Feature extraction deals with the extraction of the features from the video sequence. However feature extraction is the time consuming task in the content based video retrieval. Features extracted can be classified into various categories such as key frame features, object features, motion features.

A. Features of Key Frames

Key frame features can be classified into various categories such as colour based feature, texture based features and shape based features. Colour based features deals with the various features related to the colour such as colour histogram, colour correlogram and mixture of Gaussian model. Image is divided into block of 5x5 for capturing the features of the local color [5].

Texture based feature deals with the features the features that are not based on the colour and the intensity of the image. Gabor wavelet is generally sued to extract the features related to the texture in the video sequence.

Shape based features are the features that deals with the shapes that are being extracted from the images. Edge histogram descriptor is used for specifying or extracting the edges in the video sequence. colour based features are highly dependent on the colour spaces such as HSV, RGB,YCBCR and YUV.

B. Object Features

Features of object consists of, features related to colour, texture and size in the image. Objects can be easily extracted from the database by using the query

face for identifying the similar persons in the database. Glimpse matching technique is used to extract the object from the database as desired by the user.

C. Motion Features

Motion features are related to the semantic concept of the video sequence. Video retrieval system can be classified into two categories i.e. camera based features and the object based features For the camera based features various camera motions are considered for example zooming in and out of the video sequence, panning right or left and moving the camera up and down.

Various features are compared with the query image or video to get the desired results from the extraction. Features are compared on the basis of key frames, motion features, and static key features and so on. When the video is in motion background is added i.e. both foreground and background images area captured by camera motion.

Statics Based: static based approach is used to distribute the local and global motion of the video sequence. By this approach the features related to frame points are extracted. Generally the Gibbs model is used for extraction by the static based approach. Spatio-temporal features are measured for the local distribution related to the motion and then balancing is performed according to the original sequence of video frames.

Trajectory Based: trajectory feature are extracted from the video sequence by performing the modelling of the motion trajectories of the object.

Relationship Based Objects: this technique deals with the defining or finding the spatial relationships among the various objects of the video sequence.

V. VIDEO REPRESENTATION

Visual language has been developed for the representation of the visual data. Various issues related to representation of the video sequence are creating global archives that are reusable. Retrieval system deals with the utilizing the high level knowledge for representing the top to down retrieval system for the generation of the particular domain.

Low level features are extracted by the standard data driven representation of the domain for which we are searching the data. Various low level features associated with this technique are color histogram, shapes, texture of the image to be studied under this technique. Stratification-based key frame cliques are used for describing the features of the video which contain the information regarding the other frames of the video sequence.

VI. MINING, CLASSIFICATION AND ANNOTATION

A. Video Mining

Video mining deals with extracting the video from the database on the basis of the extracted features for finding the correlation between the various structural patterns of the video sequence. Behaviours and pattern of the object is examined to get their association according to the query given to the system on the basis of scene, event or the pattern of the moving objects in the video sequence. Semantic knowledge of the video sequence is essential for retrieving the behaviour of the object.

Object mining in the video sequence deals with the grouping of the various instances of the same object which appears in video. Special pattern detection techniques are used to extract the similar types of the object in the video sequence. Pattern discovery method is the very beneficial in retrieving the information from the large database of the video sequence. Pattern discovery is the method that can retrieve the videos based on both supervised and semi supervised learning. This technique deals with exploring the new patterns from the data to find the relevant information from the video database.

B. Video Classification

Features are extracted to find the rules and knowledge from the video sequence. Classification of the videos is becoming the important area in the processing of the video sequence. shape , texture , color and other features are used to classify the videos into the different categories classification on the basis of semantics can be categorized into the three level Genres, video events, and objects in the video. Video genre deals classification of videos into different categories on the basis of various genre such as movies, news, sports, cartoons and serials and so on. Video is classified according to the content that they are containing in them by making the subset of the entire video sequence. Objects are detected in the videos by using the object detection techniques. Various methods have been developed for detection. Basic step in tracking the object is the object detection. Object detection is basically the object of the interest that is to be tracked. Since it is known that moving objects are rich primary source of the information and it is necessary to detect such objects and get information about them. Various technique of detection are frame differencing, optical flow and the background subtraction technique.

C. Video Annotation

Video annotation deals with allocating the video sequence to the different redefined semantic concepts. For example annotating into different categories such as person, car, sky or any other living objects. Annotation is similar to the video classification method however it is slightly different

from the classification. Concepts used in both the techniques are entirely different from each other. Annotation technique is applied to the small video segments and shots however the classification is performed on the whole video.

VII. QUERY AND RETRIEVAL

Once video indices are obtained, content-based video retrieval can be performed. The retrieval results are optimized by relevance feedback.

A) Types of Query:

Queries can be classified into the two categories semantic and non semantic query type. Non semantic query deals with the various types of queries such as query by example, query by sketch, query by object. However semantic query deals with the query by keyword and query by natural languages.

Query by Example: query by example deals with extracting the low level features of the query image or the videos then extracting the similar type of objects from the database.

Query by Sketch*:* query by sketch deals with finding the similar features from the video sequence on the basis of the sketch, features are extracted matching to the sketch to find the similar data in the database.

Query by Objects: query by object deals with providing the image of object to the system, and similar images are retrieved from the database.

Query by Keywords: query by keyword deals with query in the form of keywords. This method is simplest of all the methods discussed above and provide efficient results

Query by Natural Language: Query by language deals with finding the semantic similarity among the databases to retrieve the desired output from it.

B) Measuring Similarities of Videos

Content based video retrieval technique deals with the finding the similar features among the video sequence. Various videos can be classified according to these matching types feature matching, text matching, ontology based matching, and combination-based matching. Each type is selected according to the need of the application.

Feature Matching: feature matching technique deals with finding the similarity on the basis of features. Distance between the various features is calculated to perform the matching function.

Text Matching: Text matching deals with matching the text of the query with text stored in the database. This method is simplest of all the methods to find the desired video from the query.

Ontology-Based Matching: semantic similarities are checked to measure the similarity of the videos and text in the database

Combination-Based Matching: Combination method deals with the semantic concept of matching the similar type of the data in the video sequence.

C) Relevance Feedback

Relevance feedback deals with the finding the gap between the semantic notion of search in the database. Positive and negative feedback are examined by using the relevance feedback technique.

VIII. CONCLUSION

With the advancement of technology, video processing has become the important topic of research. This paper discusses the various video retrieval techniques. Video indexing and retrieval system has been discussed to efficiently extract the desired data from the database. . Algorithm used to search the similar images may vary from application to application. Providing example contain the following information rough approximation of image to be searched. Content based video retrieval has been used in various applications such as image processing, computer vision and database management system

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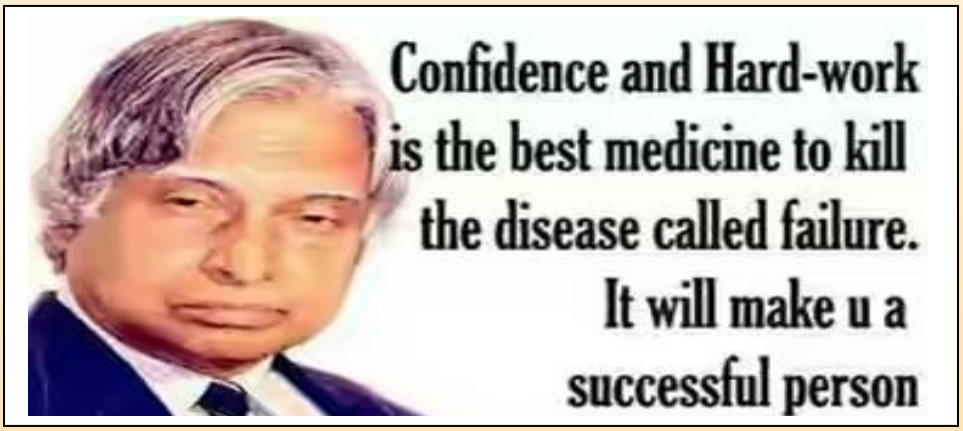
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