# A Review on Video Keyframe Abstraction Techniques

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*Abstract: Data mining is useful for mining important data from various types of objects. Video has large amount of information so it is difficult to extract video summarization. Video data mining is a technique for mining videos. There are various techniques used for it. In this paper, various techniques are explained based on video features, patterns, motions, event, structures, textures and etc. By using these techniques, shot is generated from video for video summarization. Keyframe from multiple video is extracted that provide a summary based upon keyframe. Various algorithms are used for mining video shot and image. An advantage of it is that it requires less space and time for storing and watching.*

*Keywords: Keyframe, Video shot, Video pattern, Video summarization, Content based image.*

## I. INTRODUCTION

Data mining is the process of identification of useful information from large amount of data. It is very useful for business analyst to understand this information and take a business decision. There are various types of data mining like as web mining, audio mining, video mining, distributed data mining, text mining, etc. These are the techniques for mining various types of data.

Today is a world of audio and video. A video data mining is very useful for mining video database. It is the process of taking a video database and find useful information from it. This information is used for various applications. Application of video data mining is that it requires a less space than conventional storage system, it requires a less time for video summarization and it gives useful event information from videos. There are various types of video data mining.

1. *Video structure mining*

   Video structure mining is the process of identification of object in video and it is related to semantically content of video.

2. *Video clustering and classification*

   Video clustering and classification is the process of cluster and classify various types of video and improve the browsability of video.

3. *Video association mining*

   Video association mining is the process of association between video or video keyframe.

4. *Video motion mining*

   Video motion mining is the process of mining various motions from video and identify useful event from it.

5. *Video pattern mining*

   Video pattern mining is the process of detecting a pattern from video and this pattern is useful from finding same pattern in other video such as same event in one conference event.

Video is an example of multimedia data as it contains several kinds of data such as text, image, meta-data, visual and audio and it is widely used in many major potential applications like security and surveillance, entertainment, medicine, education programs and sports [3]. With the development of the digital video processing technology, video surveillance has been playing an important role for security and management and it is necessary and important to allow the computer to automatically extract the parts of interest from videos [3]. Video abstraction techniques as an important way to organize video datasets into more condensed forms or extract compact semantically meaningful information for video browsing, retrieval, event detection and genre classification have gained lots of attentions [3]. Video is a nothing but a sequence of frame. Multimedia Data Mining can be defined as the process of finding interesting patterns from media data such as audio, video, image and text that are not ordinarily accessible by basic queries and associated results [4].

Video abstraction techniques as an important way to organize video datasets into more condensed forms or extract compact semantically meaningful information for video browsing, retrieval, event detection and genre classification have gained lots of attentions [3].

## II. RELATED WORK

Multimodal temporal panorama (MTP) approach is used to accurately extracting and reconstructing moving vehicles in real-time using a remote multimodal (audio/video) monitoring system [9] and object is classified in various categories [10]. Object such as person is detected by automatic training image acquisition and effective feature selection [11] and boundary between video is detected by motion activity descriptor [12].

Fuzzy c-mean [13] and genetic algorithm [14] is used to classifying text and image segmentation method. Event in video is detected by knowledge-based video indexing and content management framework for domain specific videos based upon association rule [15]. Soccer Video is mined by decision tree using fuzzy event mining approach [16] and also by using machine learning [17]. Video is summarized by matching low-level user browsing preferences [18]. It is useful for visualizing social data [19] and fraud in data is detected by off-line and semi-online mode [20].

## III. VARIOUS TECHNIQUES FOR KEYFRAME ABSTRACTION FROM VIDEOS

A.   Motion Focusing Method

B.   Visual Attention Clues

C.   Adaptive Association Rule Mining

D.   Subshot Segmentation Method

E.   Summarization Based On Depth And Color Information

*A. Motion Focusing Method [2]*

Motion focusing algorithm is used to extract a keyframe from video and give a summarization of video for lane surveillance system. In these types of static video, only some objects are moving and other objects are static. By taking this advantages of video, summary of images are generated from moving object that is used for useful browsing of video.

For each frame in video, apply a background subtraction method to find a objects in multiple frame. Min-cut method is used to find out changes of objects in keyframes. Next, scaling and transformation of image is performed, we calculate scaling and shifting parameters by using least square method.

To extract a keyframe from video, apply a greedy search method. Each iteration of greedy search, find out most foreground coverage from frames. This process is executed until foreground coverage is higher than 95%.

It find out different objects are moving at different speed and result is provides a summary image from different motion.

*Advantages:* It gives a relationship between object of focus and non focused motion.

*Disadvantages:* It very effective for static video recording in lane surveillance system.

### B. Visual attention clues [5]

Visual attention system model is used for keyframe video summarization. Attention detection system is divided into two parts, dynamic attention and static attention. Visual Index Descriptor (VID) is creating a visual attention model that map a difference between high level concepts and low level concepts. Dynamic attention is based upon human visual attention deduce from local and global motion. Lucas-Kanade optical-flow algorithm is used for block matching of keyframe. Keyframe is divided into size of 8 x 8 blocks. Probabilistic density function of motion model is calculated by using kernel density function, because motion vectors with incompatible orientation are often placed at object boundaries. And compute the motion attention of block then perform normalization operation. Static attention detection takes a static background region and that human should not most see. Two contrast based features like as intensity and color feature.

Final attention is produced by combination of static attention and dynamic attention and computer weight of each attention. From multiple keyframe, a keyframe which has highest VAI is selected.

*Advantages:*  It can select the most attractive keyframes, and it can easily filter out redundant keyframes without missing important visual content in a shot.

### C. Adaptive Association Rule Mining [6]

ARM is a technique for mining event from videos and it bridge a gap between Near-Duplicate keyframes and high level semantic concepts. It has not been utilized in finding the associations of the visual features of NDKs [6].

There are three steps for ARM. Data preprocessing, adaptive association rule mining and classification. In data preprocessing, near-duplicate keyframes are extracted from videos and remove irrelevant keyframe which is referred as noise.

In adaptive association rule mining, important terms and their semantically related words with its frequency are calculated and combine them into groups by using transitive closure. In classification steps, correlation between grouped terms groups and near-duplicate keyframe groups can be expressed in the form of matrix and labeled as a class. Video are classified based on this class.

*Advantages*: More useful for classifying web video event.

### D. Subshot Segmentation Method [7]

First step is egocentric subshot representation of video. In this, various objects from videos are detected based on object's features. Next step is scoring a candidate chain of subshots. Objects from step 1 is derived are searched in frames of videos and find association between object and frame. One object is searched in all videos. Next step is searching for the optimal chain of subshots. Final video is summarizing in two layers. First a matrix is created based upon color similarity and mutual influence. For major video chain of highest important values are combine to generate a final video.

*Advantages:* It clear the theme of video and one subshot lead to another subshot.

*Disadvantages:* Subshot are not more cover motion patterns.

### E. Summarization Based On Depth And Color Information [8]

It works in three steps:-

1.  *Background Establishment*

Color and depth of image is retrieved from image and it is integrated with image. Background of image is updated so that foreground and background are shown cleared.

### 2. Foreground Extraction

Object is detected from image based on depth. If depth is more, then color information is used to find out foreground.

### 3. Suspicious Event Detection

Object is detected by One-way crossing line detection and two-way crossing line detection. Alarm of two-way will be triggered when crossing warning line no matter from which side, so that just set a warning line and do not set the direction [8]. Alarm of one-way not only detects whether the moving objects cross warning line but also detects the direction of moving objects crossing [8].

*Advantages:* Integration of depth and color is better than only color and only depth [6].

*Disadvantages:* Depth information is not useful for long distance.

## IV. CONCLUSION

In this paper, various techniques for mining video are explained. The entire algorithm is selected based upon its application and usage of video. Output gives a one shot or keyframe from videos and it is gives vital information from video rather than all videos. There are many research on mining data but some more research is require to mine videos, because today is a trend of videos. There are many challenges for video summarization such as quality, accuracy, effective and boundary. Summarization of video is very useful in various applications such as video surveillance system, soccer event system, heterogeneous video, web event video, sports highlight and etc

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