Review on Video Association Mining

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Abstract

Recently, many video mining approaches have been proposed which can be roughly classified into five categories. They are: video pattern mining, video clustering and classification, video association mining, video content structure mining, and video motion mining. In this paper I'm addressing the video association mining approach. This approach is relatively new and emerging research trend. It consists of two key phases are (i) Video Pre-processing and (ii) Frequent Temporal Pattern mining. The first phase converts the original input video to a sequence format. The second phase concerns the generation of frequent patterns. I have done survey on the previous papers that are discovering associations in a given video.

Keywords: Association mining, Frequent patterns, Pattern mining, Video mining, Video Association Mining (VAM)

I. VIDEO MINING

Video mining is the process of extracting the data from the videos. Video is represented in the form of shots. Video mining consists of three major functions, such as video analysis, object detection and tracking, and video editing.

- Video analysis extracts specific scene such as highlight scene of sports program, scene of mountains, sea, etc., and detects specific event such as pause, geustures, walking, etc.
- Object detection and tracking, for example searches for a specific person and keep tracking the person.
- Video editing outputs video streams with indicating the mining results by the above functions.

II. VIDEO ASSOCIATION MINING

Video association mining is the process of discovering associations in a given video. The video knowledge is explored in a two stages, the first being the video content processing in which the video clip is segmented into certain analysis units extracting their representative features and the second being the video association features and the second being the video association mining that extracts the knowledge from the feature descriptors.

Sivaselvan et al. [1] presented a video association mining consisting of two key phases. First, the transformation phase converts the original input video into an alternate transactional format, namely, cluster sequence. Second the frequent temporal pattern mining phase that is concerned with the generation of the patterns subject to the temporal distance and support thresholds. Association rule mining, one of the most important and well researched techniques of data mining, was first introduced [2,3]. It aims to extract interesting correlations, frequent patterns, associations or casual structure among sets of items in the transaction databases or other data repositories. A lot of work was developed to find the association in the transactional databases. Video association mining is still in its infancy.

Generally two measures (Support and Confidence) have been used to evaluate the quality of an association[3]. However, these measures do not consider temporal information of the items in the association: For video associations, the temporal distance between neighboring items implies some useful information: The smaller temporal distance between neighboring items, the larger is their correlation.

Generally, Association rule mining first identifies frequent item sets and then forming conditional implication rules among them. The second step is easier, but the overall performance of a mining algorithm is determined by the efficient generation of frequent item sets.

III. SYSTEM ARCHITECTURE

Video association mining(VAM) process consists of two key phases, those are (i) Video Pre-processing and (ii) Video association mining. The video pre-processing phase converts the original input video into an alternate transactional format, namely a temporal video sequence. Video association mining phase concerns about the generation of frequent patterns subject to the temporal distance and support threshold.

Fig 1. Shows the overall system architecture, and illustrates how the two phases will carry out with the given input video. The two phases of system architectures are elaborated in the sub-sequent section.

A. Video Pre-Processing:

To access the semantic information from the video, first the video data transformed from the non-structures data into a structured from. Then it is converted into a temporal sequence database. Finally, this temporal sequence database is subjected to extract the frequent sub-sequences by applying mining algorithm.

Generally, video data are unstructured data source. So, the knowledge cannot be extracted directly. To convert in a structured format the video data is parsed into video shots. Discovering the shot boundary is the first step of the pre-processing phase.

1) *Feature Extraction:*

A video can be viewed as sequence of images bounded with spatial and temporal properties. These are typically segmented into shots represents a contiguous scene with a certain context. Automatically identifying the boundary between shots (shot boundary detection). Once a shot has been identified, it is often represented by a key frame (a frame that is the most representative of all frames in the shot). The key frames is then used for extracting features such as object, text, audio.

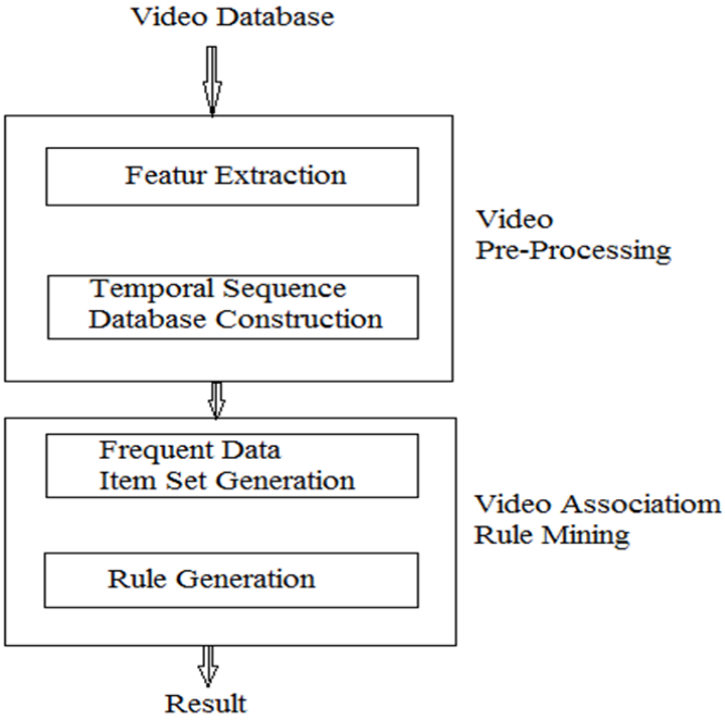

Fig 1: Video Association Mining System Architecture

2) *Video Sequence Construction:*

Generally, each and every symbolic stream (visual, audio, text and objects with frame window) is assigned a symbol for constructing the video sequence. Each key frame in the video is treated as time unit and transform the extracted features of each time unit into symbolic streams according to the Look-up Table (consisting the equivalent symbol for every feature) mapping. Finally the original video data is transformed into temporal video sequence which consists of multiple streams into single stream. The transformed structured video sequence is used to mine the association in video database.

B. Video Association Mining:

It aims to extract the interesting patterns, associations among the set of items in a video temporal sequence database. It contains two steps. (i) Discovering the frequent sub sequence, (ii) Rule generation.

1) *Frequent Subsequence Generation:*

Several algorithms have been proposed for discovering frequent temporal subsequence in video sequence. Frequent temporal sequential pattern mining fall into two big categories: Apriori-like and FP-growth-like.

The efficiency of frequent item-set mining algorithms is determined mainly by three factors: The way candidates are generated, the data structure that is used and the implementation details.

2) *Rule Generation:*

The knowledge to be discovered is in the form of association rules, which are mined from temporal video sequence retrieved from a large corpus.

IV. ISSUES OF VIDEO ASSOCIATION MINING

Task	*Approaches/Application*	*Issues*
Data preprocessing	*Shot level, Frame level, Region (object) level, scene level*	*Depends on video data model and application domain*
Feature Extraction	*Text feature, Motion feature, Region level*	*Visual feature and audio features are sensitive to the parameters motion calculations*
Video Data Construction	*Apriori based finding sequence of events*	*Finding semantics boundaries; Scalability, efficient data is used*

V. CONCLUSION

Video Association Mining (VAM) is the process of discovering associations in a given video. In this paper, we have discussed the video mining and one of approach of Video mining is Video Association Mining and the architecture of the same. In this the given video is first transformed it from video frames to a video sequence dataset by using Video Pre-processing. Then Association rule mining is used to generate frequent patters, and we also discussed the current issues of Video Association Mining.

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