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Information Retrieval:Using Video Data Mining Methods

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***Abstract* - Video content is always hug 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 of 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. This process is carried out in various steps. One such important step is clustering, which is data mining is the process of discovering groups in a dataset. In this paper, we attempt to give a comparative study of existing algorithms suitable for video data mining.**

***Key words* - Hierarchical clustering, Video data mining, Image processing, Birch, Cure.**

1 INTRODUCTION

The usage of the images has been increasing day by day as they are not only being used for expressing and explanation but also for identification and analysing. They are being used in every field today. Large amounts of image data is being stored in the databases everyday [1]. All the data can only be used efficiently only when the correct data is retrieved successfully. The present day there are only a couple of systems that implement the retrieval mechanism based on content. The proposed system identifies the objects in the images based on the colour distribution and performs the search. A colour histogram is generated and image segmentation is done to obtain the suitable images [2]. Every image is made up of tiny bins called pixels and each pixel is made up of the Red, Green and Blue colours. The system utilizes these values in retrieving the suitable solutions. The main motivation of video mining is to find undiscovered knowledge from the stream based on visual and audio cues [3].

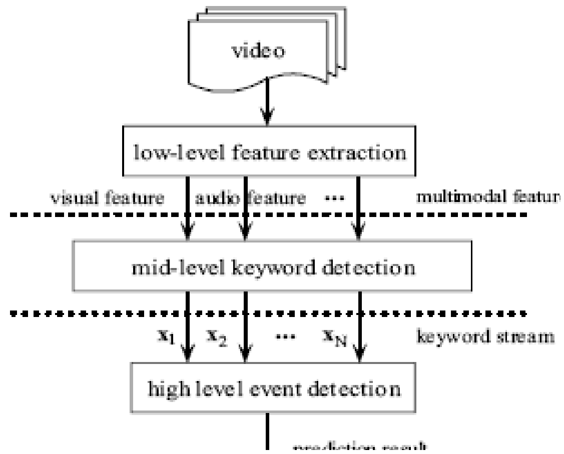

Fig.1. video frame work

2. SOME RESEARCH ORGANIZATIONS OF VIDEO MINING

Based on our investigation, to date, the following organizations have done deeper work on video mining.

(1) DIMACS Workshop.

DIMACSI play a national leadership role in the development, application and dissemination of the inteiTelated fields of discrete mathematics and theoretical computer science. They held an international conference on video mining on November 4-6, 2002 at Rutgers University.

(2) MIERL

The researchers consider the video mining problem in the light of existing data mining techniques their approaches to video mining are to think of it as "blind" or content-adaptive processing that relies as little as possible on a priori knowledge. The processes of video mining are first to extract the features of video content, and then use adaptively constimicted statistical models of usual events to discover unusual audio-visual pattems.

(3) Computer & Information Science Department of Temple University

They think video mining is extracting information from video data using image and video processing techniques. E.g.: detecting special events, finding the similar video clips. They hold a curriculum named video process and mining from 2003, which talking about objects detection, tracking, events recognition and video content analysis

(4) DVMMlab4 of Columbia University.

They give attention to mining periodic patterns from semantic video events from 2001. They think video pattems are multilevel, from features to events, which can be discovered by using hierarchical hidden Markov models,

3 TWO FEASIBLE WAYS FOR VIDEO MINING

Besides spatial features, there are temporal features, audio features, and features of moving objects in video [4, 5, and 6]. Data of all these features can be used to mine. On one hand, video with different contents and structures can be mined with different results in that patterns are recruitments, predictable occurrences of one or more entities that satisfy statistical, associative, or relational conditions On the other hand, different applications need different video mining techniques to get different interesting results. From the content and structure. The exist two main ways to implement video mining: video structure mining and video motion mining.

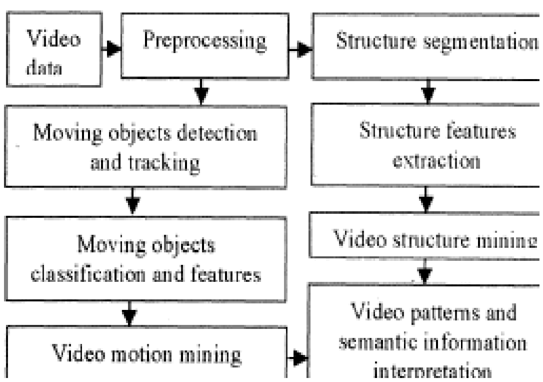

Fig2. Video Data Mining Approach

3.1 FEATURE BASED VIDEO MINING APPROACHES

There are two levels in video mining. One is semantic information mining which is directly at the feature-e level: e.g., the occun-ence of primitive events such as one pedestrians passing over somewhere. [7[18] another is pattems and knowledge mining which is the higher-level, pattems may represent cross-event relations: e.g... news stories across multiple broadcast channels or repetitive play-break alternations in spoilt.

From the functions, feature based video mining approaches can be classified as follows:

(1) Video clustering mining

These approaches utilize some clustering algorithms like k-means to organize similar video objects by their features into clusters[8]. So, the features of every cluster can be used to evaluate the video shots that contain those video objects.

(2) Video classification mining

According to histogram of shot, motion features of moving objects, or other semantic descriptions, video classification mining approaches classify video objects into some categories. So, the semantic descriptions or the features of every category can be used to mine the implicit patterns among video objects in that category [9].

(3) Video association mining

The data of extracted features of video objects can be constructed into structural data stored in database. So, conventional association rule mining algorithms can be used to mine the associational patterns; e.g., discovering two video objects always occurring simultaneously. Getting the association information that important news.

(4) Video trend mining

Obviously, video consists of sequential frames [10] [19]. Temporal features of video such as motion features are capitulated to time. Techniques of time series analysis and sequence analysis all can be used to mine the temporal pattems of temporal features, activities trends of moving objects and events.

4 REQUIREMENTS OF A VIDEO MINING SYSTEM

The following requirements for a video mining system:

1 1. It should be unsupervised.

2 2. It should not have any assumptions about the data

3 3. It should uncover interesting events.

Note that requirements 2 and 3 are somewhat contradictory, since the notion of “interesting” is subjective, and highly dependent on knowledge of the content. [11] Therefore requirement 2 by aiming for having as few assumptions as possible.

4.1 THE MINING ALGORITHM

Our video association mining algorithm consists of the following phases:

1. Transform. This phase adopts various techniques to explore visual and audio cues and transforms video data into a relational data set D.

2. L-Item Set. In this phase, we mine video associations with various levels and lengths. We first find an L-Item Set and then use the L-Item Set and user specified thresholds to find –L Item Set. We iteratively execute this phase until no more nonempties L Item Set can be found.

3. Collection and Post processing. This phase collects and post processes video associations for different applications. 215

Procedure V

Input: 1. Hybrid data stream

2. Max association level max_leve

3. TDT and minimal support and confidence in selecting association the different levels minsup[l], minconf[l].

Output: Minied mulit_lelvel video association

1. For i=1;<=max_leve;i++
2. d[l]=filter_dat set (d1,l0
3. 3.I[l,1]=Get_itemset[d[l]]
4. l(l,1)- get_itmeset[d[i]]I[l,1],minsup[l]
5. fork=2;l(l,k-1);k++
6. i[l,k]=Candida generation(l(l,k-l))
7. for each k_item association {x},in I[l,k],{x}.

5. CLUSTERING ALGORITHIMS SUITABLE FOR VIDEO DATA MINING

Current video data mining techniques emphasize on pattern discovery [12]. We require content-adaptive pattern discovery techniques that would adapt to variations in content, and make the event search tractable... Clustering in data mining is a discovery process that groups a set of data. Out of four clustering approaches, Hierarchical algorithms are best suited for video data miming due to its simplicity and efficienty, they produce a nested sequence of clustering, with a single all inclusive cluster at the top an single point clustering at the bottom[13][14][15] Hierarchical clustering algorithms are classified a agglomerative or divisive. The agglomerative (bottom up) approach repeatedly merges two clusters, while the divisive (top down) approach repeatedly splits a cluster into two. Agglomerative clustering method does not suit video data mining application due to following reasons, they don not scale well time complexity of at least o(n2) where n is the number of total objects, can never undo(backtrack) what done previously and do not give rise to dead end solution. Divisive clustering method is suitable for statistical analysis this method cannot be used fro video data mining as they can never undo. Hence a best suited clustering algorithm for video data mining would be integrated hierarchical clustering with another rclustering technique. Many algorithms were proposed like BIRCH, CURE, CHAMELEON etc integrating hierarchical and distance based clustering methods.

Output: 100 Decision Trees.

1. Transform the numeric values of each of the record for attribute *i A* into binary categorical values using:

2.1. A random cut/threshold value *i Cut* , which is a number in the range (0-360) for the H value ((1+3m)-th attributes), where m=0, 1,…, 255. For S, B attributes the random

Numbers would be in the range (0-100).

2.2. Save the threshold *i Cut* , for attribute *i A* .

3. Iterate steps 1 to 2 for all the attributes *i A* , where *i = 1, 2, … , 768.*

4. Define tree node *R D* and *D* ; where *R D* is the root node and *D* is an ordinary node. Assign *D* = *R D*

5. Assign the record set to the tree node *D* 6.1. Calculate the Information Gain, , ( ) *i IG A* for all the attributes *i A* for node *D* using the method defined in section 'D'.

6.. Get the maximum information gained attribute *m A* .

7. Divide the record set of a node *D* according to the attribute *m A* and its threshold value *m Cut* to generate child nodes *c D*

8. Update *D* = *c D* ; where c=1,2.

9. Iterate 5 to 8 until: every node *D* = *f D* ; where *f D* is a leaf node with all records from the same class .

10. We will have a tree *k T* with root node *R D* .

11. Iterate 1 to 10 for *k =1,2..100;* this will generate 100 Trees.

6. APPLICATIONS OF VIDEO MINING

Transforming low-level features of video objects into high-level semantic information and video patterns from massive amounts of video data are the goal of video mining [16] [17]. Implicit, previously unknown, and potentially useful pattems and knowledge can assist government, enterprise. Military. Etc in knowledge acquiring, decision making, security management. The applications of video mining mav be including but not restricted to:

(1) Automatic analysis for surveillance video**:** Detecting pattems, recognition of suspicious people in large crowds; detection of traffic patterns; monitoring of surveillance in theft or fire

protection, care of bedridden patients and young children.

(2) Automatic quality control in manufacturing processes for shoddy detection and management.

(3) Intelliger
scalar. St

(4) News video association mining to discover the association rules of events from long-term news to get some valuable patterns.

(5) Video classification of massive and multi-thematic video library to improve search pruning or retrieval.

(6) Television programs mining for getting narrative style. time and effect pattems of advertisement, etc.

7. CONCLUSIONS AND REMARKS

This paper attempts to give a clear concept for video mining. The feasible approaches and possible applications of video mining are discussed as well. We should point out that. the current status of video mining is very premature due to the non-structured nature of video data .Firstly. It is difficult to extract perfect features. Secondly, video mining algorithms need little assumption for any video data. So. How to mine the video with different type or length? How to represent the patterns with effective models? Thirdly. How to interpret and use the mined semantic information and pattems? All these questions are needed to research. Although the In research of video mining is at the elementary stage, many concepts and approaches are coming into being. Applications of video mining techniques are wide and promising. We believe that a lot of approaches and systems of video mining would appear and consummate continuously with further study.

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