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Parallel Visual Information for Video Retrieval using Phylogeny

Thenmozhi.V

Research Scholar, Department of Computer Science, PSG College of Arts & Science, Coimbatore, India

ABSTRACT: Data mining is frequently described as the process of extracting valid, authentic, and actionable information from large databases. In other words, data mining derives patterns and trends that exist in the data. These patterns and trends can be collected together and defined as a mining model. Acquisition and storage of video data can be done easily. But to retrieve the useful information from video is a very challenging task. To solve this problem video data mining technique is used to extract the semantic information as per user demand automatically. The main aim of the proposed system is evaluating video similarity is based on the percentage of similar frames and the temporal characteristic of videos. For the particular problem of measuring video similarity, when dealing with temporal order, frame alignment, gap, and noise together, all existing multidimensional sequence similarity measures such as normalized pair-wise distance. This model assumes query and target subsequence are strictly of the same ordering and length, our approach adopts spatial pruning to avoid seeking over the entire database sequence of feature vectors for exhaustive comparison.

KEYWORDS: video retrieval algorithm; video mining; frame acquisition; precision and recall.

I. INTRODUCTION

The goal of data mining is to discover and describe interesting patterns in data. This task is especially challenging when the data consists of video sequences which may also have audio content, because of the need to analyse enormous volumes of multidimensional data. The richness of the domain implies that many different approaches can be taken and many different tools and techniques can be used. They deal with clustering and categorization, cues and characters, segmentation and summarization, statistics and semantics. No attempt will be made here to force these topics into a simple framework. In own words, the chapters deal with video browsing using multiple synchronized views; the physical setting as a video mining primitive; temporal video boundaries; video summarization using activity and audio descriptors; content analysis using multimodal information; video OCR; video categorization using semantics and semiotics; the semantics of media; statistical techniques for video analysis and searching; mining of statistical temporal structures in video; and pseudo-relevancy feedback for multimedia retrieval.

II. RELATED WORK

Many authors have proposed methods to extract key frames in the past few years. They provide a Comprehensive overview of key frame extraction methods. A simple method of key frame extraction is to select the middle frame of each shot or the first and the last frame of each shot as the key frame. The sequential methods consider a new key frame when the content difference from the previous frame exceeds a predefined threshold that is determined by the user. The author in[1] describes the usage of shot boundary based approaches to select a key frame from a fixed position in the shot or several frames separated by a fixed distance.
The author has presented the segment of video sequence into shots by an unsupervised clustering method, the frame closest to the cluster centroid is chosen as the key frame for the video shot, and only one frame per shot is selected, regardless of the duration or activity of the video shot[2].

The author has proposed a key frame extraction method using multiscale phase-based local features based on corner detector, the frame with high similar match to the given target model is extracted as key frame [3] authorapply a statistical model to divide the frames into clusters, select a key frame from each candidate cluster, but the statistical

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model is directly relate to cluster result. The main drawback of these methods can not to automatically determine the number of clusters to capture adequately the major visual content.

In another way of retrieving [5] the input to the system is digitized video clips from which the shots are detected and the key frames extracted from each shot. It computes a feature vector for each key frame and cluster the key frames based on the feature vector. The last stage assigns semantic interpretations (assigning abstract concepts) to various clusters. These semantic interpretations are then used in the retrieval system to index and browse the video database. At the clustering stage, it is desirable to cluster the shots into semantic categories such as presence/absence of buildings, text, specific texture, etc. Some research work has been done on video mining like [7] where authors focused on mining on medical video to detect the events from medical video. But in our paper we describe video data mining for video application in general, which can be applied to retrieve information from different video applications more frequently.

III. PROPOSED ALGORITHM

The proposed system has several advantages over other systems for shot cut, retrieval and object mining. It combines different aspects of a video processing system within a unified framework using a single set of features. Novel techniques are proposed for each step of a video mining system which is listed below. According to different user requirements, video search intentions can be generally classified into three main categories:

- Detecting instances of copies
- Identifying visual similarities of near duplicates.
- Retrieving entries in a broad sense of high level concept similarity

A. *Description of the Proposed Algorithm:*

Naïve Bayesian techniques can be applied and extract hidden predictive pattern or information from video database. In the work, they develop how to segment the incoming raw video stream into meaningful pieces, and how to extract and represent some feature (i.e., motion) for characterizing the segmented pieces. Then, the motion in a video sequence is expressed as an accumulation of quantized pixel differences among all frames in the video segment. A method for classification of different kinds of video that uses the output of a concise video summarization technique that forms a list of key frames is present. A video frame sequence is an ordered set of a large number of frames, and from the database research perspective, each frame is usually represented by a high-dimensional vector, which has been extracted from some low-level content features, such as color distribution, texture pattern, or shape structure within the original media domain. Matching of video frames is implemented into searches among this feature. The system mainly contains the following:

- Frame Acquisition
- Frame Information extraction
- Dense Segment Extraction
- Visual content similarity mining
- Quality measures

Frame Acquisition is a significant super-set of the support for digital still imaging drivers that were provided by the Still Image Architecture (STI) in Windows. Frame Information extraction (FIE) is a type of image information retrieval whose goal is to automatically extract structured pixel information. The dense segment extraction is a “query-aware” process, i.e., video segmentation is materialized on-the-fly. It is different from the offline pre segmentation by detecting shot boundaries typically in video retrieval.

IV. PSEUDO CODE

Algorithm: Naive Bayes Algorithm

```
Function train (i)    #   an example containing attribute/ value pairs in some class
{
  Instances++         # update number of instances
  if (++N[$class]==1) classes++# update counts for each class
```

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```
  for(i=1;i<=Attr;i++)
    if (i != class)
     if (value != "?")        #: skip missing values
       symbol(i,$i,$class)
}
function symbol(col,value,class)
{
  Count[class,col,value]++;   #: increment frequency counts
}
```

Process steps:

Step 1: First step converts fortune cookie messages into features to be used by a naive Bayes classifier.
Step 2: The second phase, which is the training phase, the naive Bayes classifier reads in the training data along with the training labels and learns the parameters used by the classifier.
Step 3: The next phase, Is the testing phase where the trained naive Bayes classifier classifies the data in the testing data file.
Step 4: Output the accuracy of the naive Bayes classifier by comparing the predicted class label of each message in the testing data to the actual class label. The accuracy is the number of correct predictions divided by the total number of predictions.

Precision
Precision is the probability that a (randomly selected) retrieved document is relevant. In the field of accurate calculation, precision is the fraction of Total number of Test Inputs that are Correct Result of the find:

$$\text{precision} = \frac{|\{\text{Correct Result}\} \cap \{\text{Total number of Test Inputs}\}|}{|\{\text{Total number of Test Inputs}\}|}$$

Recall
Recall is the probability that a (randomly selected) relevant document is retrieved in a search. Recall in of accurate calculation is the fraction of the documents that are Correct Result to the input that are Total number of Test Inputs.

$$\text{recall} = \frac{|\{\text{Correct Result}\} \cap \{\text{Total number of Test Inputs}\}|}{|\{\text{Correct Result}\}|}$$

In the random selection refers to a uniform distribution over the appropriate pool of documents; i.e. by **randomly selected retrieved document**, In this selecting a document from the set of retrieved documents in a random fashion. The random selection should be such that all documents in the set are equally likely to be selected.Another interpretation of precision and recall is as follows. Precision is the average probability of relevant retrieval. Recall is the average probability of complete retrieval. Here we average over multiple retrieval queries.

V. SIMULATION RESULTS

The simulation studies involves in choosing the most challenging 40 queries to query the videos from video database. Those queries are selected from the videos present in the video database. The proposed video retrieval algorithm is implemented with MATLAB. We collect the video Archives from EVVE website, and choose the most complex 40 queries to search video. The downloaded number of videos for each query is up to 100. We extracted more than 50 videos from the video dataset archives. After filtering out the videos who sizes are lesser than 1M, the Combined Dataset contains **50**videos in total. To our best knowledge, this is the biggest Web video dataset for experimental purpose. We further extract 1000 key frames from these videos. This dataset is released to the public so that other researchers will be able to use it as a test bed.
The database in the experiments was made up of one thousand video clips downloaded from the internet. The total length of video data is approximately one hundred and sixty hours, including various contents such as news, sports, movie, cartoon, teleplay and natural scene etc. The experiments performed in this research work are to evaluate the performance of the Naïve Bayes classification algorithm and follows as tested data set.

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Bayes classifier has several properties that make it surprisingly useful in practice. In particular, the decoupling of the class conditional feature distributions means that each distribution can be independently estimated as a one dimensional distribution. This in turn helps to alleviate problems stemming from the curse of dimensionality, such as the need for data sets that scale exponentially with the number of features.

COMPARISON OF PRECISION VALUES

CATEGORY	Existing Method	Proposed Method
Test Video 1	60	90
Test Video 2	59	95
Test Video 3	90	93
Test Video 4	80	93
Test Video 5	52	91
Average	64.85	93.29

Table.1.Comparision of precisions value

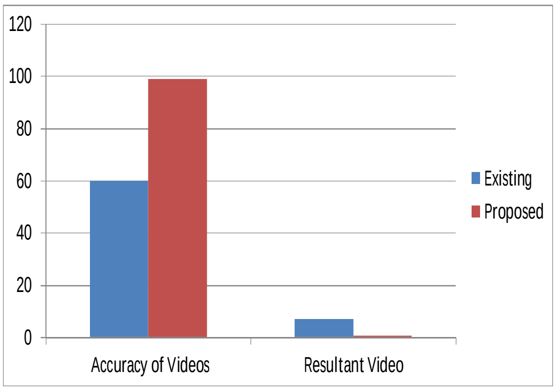

Fig 1. Energy Consumption by Each Node

Table1 provides the comparison of the existing methodology with the proposed work based on the precision value and it also shows that the proposed method is the better method to retrieve the videos from a large database.

Fig 1 clearly portrays the current work, which shows the rate of accuracy of the video retrieved is more in the proposed work.

Fig 1 shows the accuracy measure chart of the video retrieval of both the existing and proposed methods.

The system chooses the most challenging 40 queries to query the videos from video database. Those queries are selected from the videos present in the video database. The downloaded number of videos for each query is up to 100. We extracted more than 50 videos from the video dataset archives. After filtering out the videos who sizes are lesser than 1M, the Combined Dataset contains **50** videos in total. To our best knowledge, this is the biggest Web video dataset for experimental purpose. We further extract 1000 key frames from these videos.

The total length of video data is approximately one hundred and sixty hours, including various contents such as news, sports, movie, cartoon, teleplay and natural scene etc. Bayes classifier has several properties that make it surprisingly useful in practice. In particular, the decoupling of the class conditional feature distributions means that each distribution can be independently estimated as a one dimensional distribution. This in turn helps to alleviate problems stemming from the curse of dimensionality, such as the need for data sets that scale exponentially with the number of feature.

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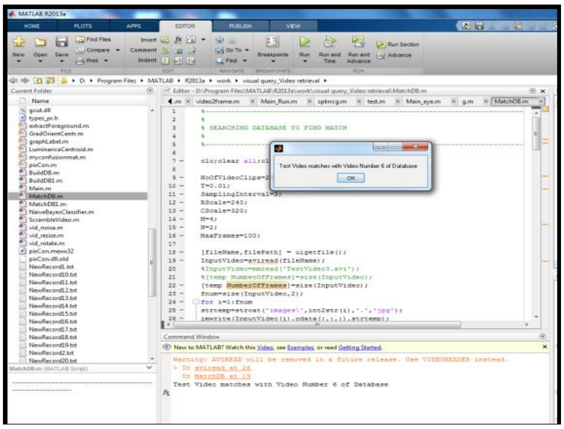
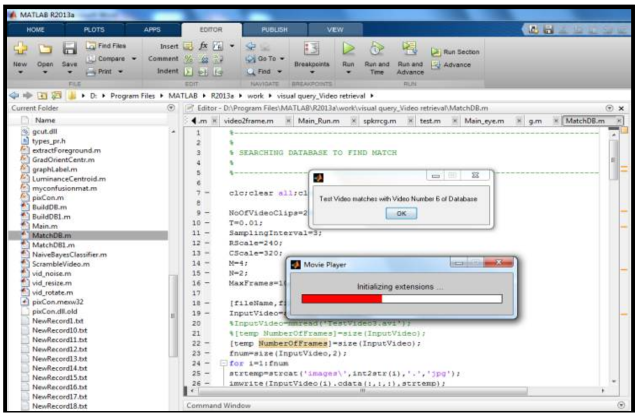
SEARCHING THE VIDEO CLIP TO THE VIDEO DATADASE



TO VIEW INSTALLATION PROCESSING OF THE VIDEO CLIP



DISPLAY THE OUTPUT MEDIA PLAYER

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ADVANTAGES

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- Detecting instances of copies.
- Identifying visual similarities of near duplicates.
- Retrieving entries in a broad sense of high level concept similarity.

VI. Conclusion and Future Work

Our video similarity model which elegantly achieves a balance between the approaches of neglecting temporal order and strictly adhering to temporal order is particularly suitable for dealing with this case, thus can support accurate identification. Although the only colour feature is used in our experiments, the proposed approach inherently supports other features.

For the future work, Plan to further investigate the effect of representing videos by other features, such as ordinal signature. Moreover, the weight of each factor for measuring video similarity might be adjusted by user feedback to embody the degree of similarity more completely and systematically.

It has presented a novel approach for video retrieval. The proposed method can be used for retrieval of criminal information, e-learning, news video browsing, and digital multimedia library retrieval and defense applications. This approach can further be enhanced by integrating content features like frequency, histogram, etc. with data mining techniques. To further investigate the effect of representing videos by other features, such as ordinal signature. Moreover, the weight of each factor for measuring video similarity might be adjusted by user feedback to embody the degree of similarity more completely and systematically. Video Compression and denoising can be added in future to the current system. The System can include the video condensation approaches to reduce the size of the video file.

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