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MULTIMEDIA MINING

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ABSTRACT

Multimedia data mining is a popular research domain which helps to extract interesting knowledge from multimedia data sets such as audio, video, images etc., Multimedia mining refers to pattern discovery, rule extraction and knowledge acquisition from multimedia database. Multimedia mining is used to find useful information from large multimedia database system by using various multimedia techniques and powerful tools. This paper, elaborates basic concepts of Multimedia mining, architectures for structured and unstructured data in multimedia mining, techniques and its application in various areas.

Keywords: Multimedia

INTRODUCTION

Multimedia mining is a subfield of data mining which is used to find interesting information of implicit knowledge from multimedia databases. Multimedia data are classified into five types; they are (i) text data, (ii) Image data (iii) audio data (iv) video data and (v) electronic and digital ink [1]. *Text data* can be used in web browsers, messages like MMS and SMS. *Image data* can be used in art work and pictures with text still images taken by a digital camera. *Audio data* contains sound, MP3 songs, speech and music. *Video data* include time aligned sequence of frames, MPEG videos from desktops, cell phones, video cameras [2]. Data mining tool operate on structured data so that powerful tools are required for the unstructured or semi-structured data and dynamic audio-visual features available in multimedia database. Figure 1 shows present architecture which includes the types of multimedia mining process [3]. *Data Collection* is the initial stage of the learning system; *Pre- processing* is to extract significant features from raw data, it includes data cleaning, transformation, normalization, feature extraction, etc. *Learning* can be direct, if informative types can berecognized at pre-processing stage. Complete process depends extremely on the nature of raw data and difficulty's field. The product of pre-processing is the training set. Specified training set, a learning model has to be selected to learn from it and make multimedia model is more constant.

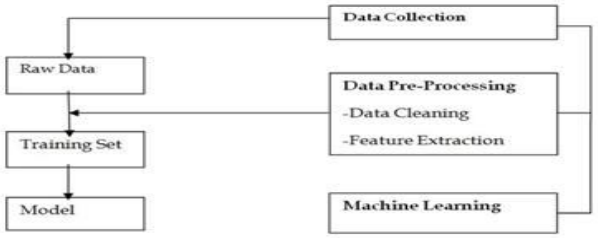

Fig 1: Multimedia Mining Process

2. Architectures for Multimedia Data Mining

The multimedia mining architecture has several components as shown in figure 2. Important components are (i) Input (ii) Multimedia Content (iii) Spatiotemporal Segmentation (iv) Feature Extraction (v) Finding the similar Patterns and (vi) Evaluation of Results.

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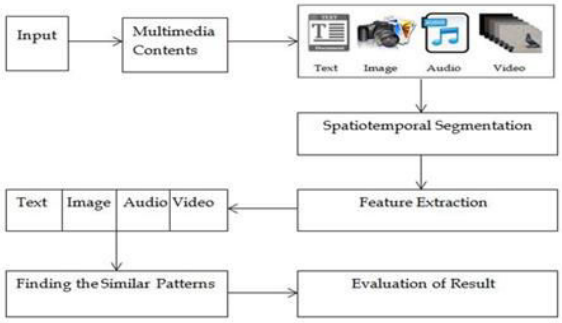

Fig 2: Multimedia Data mining Architecture

Input: It comprises which multimedia database is used for finding the pattern and to perform data mining process.

Multimedia Content: It is a data selection stage which requires the user to select databases, subset of fields or data to be used for data mining.

Spatio-temporal segmentation: It is nothing but moving objects in image sequences in the video.

Feature Extraction: It is the pre-processing step that involves integrating inputs to the pattern finding stage. Such representation of choices is required because certain fields could include data at various levels and not considered for finding the similar pattern stage.

Finding the similar pattern: It is the heart of the whole data mining process. The hidden patterns and trends in the data are basically uncovered in this stage.

Evaluation of Results: It is a data mining process used to evaluate the results and this is important to determine whether prior stage must be revisited or not. This stage consists of reporting and makes use of the extracted knowledge to produce new actions or products and services or marketing strategies [4].

3. Techniques for Multimedia Mining

The techniques which are used to perform multimedia data are very important in mining. Commonly four different multimedia mining techniques have been used. These are classification, association rule, clustering and statistical modeling.

Classification: Classification is a technique for multimedia data analysis, can learn from every property of a specified set of multimedia. Classification is the process of constructing data into categories for its better effective and efficient use, it creates a function that well-planned data item into one of many predefined classes, by inputting a training data set and building a model of the class attribute based on the rest of the attributes. Decision tree classification has a perceptive nature that the users conceptual model without loss of exactness. Hidden Markov Model used for classifying the multimedia data such as images and video as indoor-outdoor games [5].

Association Rule: Association Rule is one of the most important data mining technique which helps to find relations between data items in huge databases. There are two different types of associations in multimedia mining: association between image content and non-image content features [6].

Clustering: Cluster analysis divides the data objects into multiple groups or clusters. Cluster analysis combines all objects based on their groups. Clustering algorithms can be divided into several methods they are hierarchical methods, density-based methods, grid-based methods, and model-based methods, k-means algorithm and graph based model [7]. In multimedia mining, clustering technique can be applied to group similar images, objects, sounds, videos and texts.

Statistical Modeling: Statistical mining models are used to regulate the statistical validity of test parameters and have been used to test hypothesis, undertake correlation studies and transform and make data for further analysis. This is used to establish links between words and partitioned image regions to form a simple co-occurrence model

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[8].

Applications of Multimedia Mining

There are different kinds of applications in multimedia data mining, some of which are as follows:

Digital Library*:* The collection of digital data are stored and maintained in digital library, which is essential to convert different formats of digital data into text, images, video, audio, etc..,

Traffic Video Sequences: In order to determine important but previously unidentified knowledge from the traffic video sequences, the detailed analysis and mining to be performed based on vehicle identification, traffic flow, and queue temporal relations of the vehicle at intersection.

Medical Analysis: Multimedia mining is primarily used in the *m*edical field and particularly for analyzing medical images. Various data mining techniques are used for image classification. For example, Automatic 3D delineation of highly aggressive brain tumors, Automatic localization and identification of vertebrae in 3D CT scans, MRI Scans, ECG and X-Ray.

Customer Perception: It contains details about customers opinions, products or services, customers complaints, customers preferences, and the level of customer‘s satisfaction of products or services which are collected together. Many companies have call centers that receives telephone calls from the customers.

Media Making and Broadcasting: Radio stations and TV channels creates broadcasting companies and multimedia mining can be applied to monitor their content to search for more efficient approaches and improve their quality.

4. Conclusion

This paper proposes a survey of multimedia mining. The key idea is to provide review of multimedia, which is an active and growing area of research. Multimedia mining is one of the important and challenging research domains in the field of computer science. Most of the researchers are interested to do their research work in the field of multimedia mining. Many challenging research problems are available in multimedia mining. These problems can be solved by developing new algorithms, concepts and techniques for extracting hidden knowledge from the multimedia data bases.

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