Survey on a New Approach for Video Cut Detection Using Fuzzy Logic Control

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Abstract

Shot boundary detection is one of the most basic important methods for video analysis and video application. This paper offers a tutorial and overview of the automatic video shot boundary detection algorithm focusing on methods for normalized histogram, RGB color histogram, representing histogram extraction into its basic component its shots. Finally, we analyze future video sequences.

***Index Terms*—histogram, video analysis, video application, shot boundary detection.**

1. Introduction

Shot transition detection also called cut detection is a field of research of video processing. Its subject is the automated detection of transitions between shots in digital video with the purpose of temporal segmentation of videos.

Among other, shot boundary detection (SBD), also known as temporal video segmentation is one of the important aspects. Parsing a video into its basic temporal units -shots- is considered as the initial step in the process of video content analysis. A shot is a series of video frames taken by a single camera, such as, for instance, by zooming into a person or an object. Frame is a single picture or still shot, that is shown as part of a larger video or movie. Many single pictures are run in succession to produce what appears to be a seamless piece of film or video tape .a scene is defined **a** shot or series of shots in a movie constituting a unit of continuous related action. Partitioning of the video sequence by detecting scene changes is essential for video indexing, parsing, characterization& categorization of video. Although it may seem a simple task, the automatic and reliable extraction of shot boundaries it has some difficulties mainly due

to the different types of video sequences, for simple shot transitions like hard cuts (abrupt transition)& soft cuts(gradual transition).we can divide the existing techniques for shot boundary detection into the following basic categories: pixel histogram, block extraction, object segmentation . Histogram based methods compare the histograms of a pair of frames using a suitable histogram distance. In contrast to pixel based methods, histogram based methods are robust against camera and object motions since the histograms do not contain any spatial information. Unfortunately, the main critic and limitation is that frames of different shot can have similar histograms and in this way these methods will fail. In addition, like pixel-based methods, these methods are not robust against lighting changes. The automated methods of classifying video are an important and active area of research is demonstrated by the existence of the TRECVID video retrieval TRECVID provide the datasets and common task that allow researchers to compare their methodologies under similar conditions. In this paper we introduce a simple method for the detection of hard cuts using only inter frame differences.
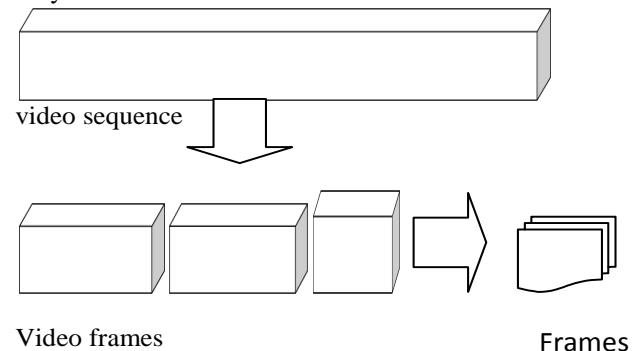

video sequence

Video frames

Frames

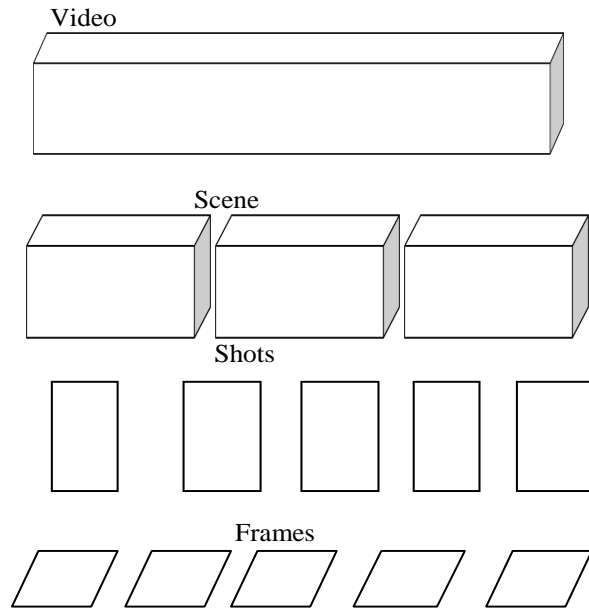Fig 1.Frame Work Architecture

Fig 2.Shot-Oriented Video Semantics Interpretation

Table 1. SURVEY ON VIDEO CUT DETCTION

YEAR	PAPER	TOPIC
2009	3	Fuzzy color histogram based video segmentation
	4	Histogram based CBIR system
2011	1	Video cut detection using Gabor filtering
1996	6	Compassion of video shot boundary detection
2007	5	Efficient and robust shot change detection
1998	2	Robust video shot change detection

2. Methodology

2.1. Gabor Filtering

Automatic video detection technique using Gabor filtering and Pixel differences based techniques is a simplest way of measuring the visual content discontinuity is to compare the corresponding pixel instances between two successive frames histogram comparison based approaches. Video cut detection using edge oriented methods and motion based approaches, statically feature based techniques.

Advantages: very efficient in clustering distance between feature vectors of consecutive frames. Pixel based approach is the simplicity of their implementation edge histograms of the video frames can also be used for shot cut detection.

2.2. Content Copy Based Detection

Fuzzy color histogram-based video segmentation recent developments in multimedia technology with the significant growth of media resources introduced content-based copy detection (CBCD) as a new research field alternative to the water marking approach for identification of video sequences. the color histogram generated with the fuzzy linking method on L*a*b* color space, the system extracts a mask for still regions and the window of picture-in-picture transformation for each detected shot, which will be useful in a content-based copy detection system.

We provide the details of our shot-boundary detection method and other techniques that we use to identify the transformations applied on a query video.

2.3. Detection of Frame-Dropping Transformation

Handling frame-dropping transformation is one of the key features of a shot-boundary detection system specialized for CBCD applications

2.3.1. Noise Detection

CBCD applications should handle query videos with heavy noise transformations. Noisy frames/shots should be identified before any further operation that is based on edge detection or use standard deviation of pixel intensity values.

2.3.2. Mask Generation

Content-based copy detection system should cut out the artificially inserted texts, patterns, logos, etc., if possible. Besides, it should ignore the bordering black areas produced by shift, crop, and letterbox transformations. As a result, the probability of matching with the original video segment is increased. We calculate the standard deviation of each intensity value of the pixels with in the shot.

Advantages:

The main advantage of the proposed fuzzy color histogram over a conventional color histogram is its accuracy. Since the system is more robust to illumination changes and quantization errors, it performs better on shot boundary detection.

Three main parts of the proposed system, noise detection, shot boundary detection, and window extraction of picture-in-picture transformation, are evaluated. Our test dataset is composed of query videos provided for TRECVID 2008 content-based copy detection task.
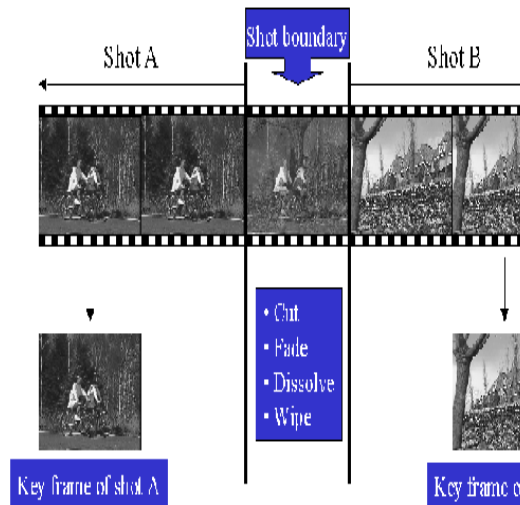
Fig 2.Shot Boundary Detection

2.4. CBIR-Fuzzy Color Histogram System

A fuzzy color histogram construction method for content-based image retrieval. Fuzzy color histogram bins by using a Mamdani-style fuzzy inference system. There are some notable studies on fuzzy color histogram and its application to content-based image retrieval. Han and Ma introduce a fast approach for computing fuzzy color histogram using fuzzy c-means algorithm. They find a correspondence between conventional color histogram (CCH) and fuzzy color histogram (FCH), and compute the FCH of an image without dealing with membership functions. Histogram based methods have shown a good performance for shot cut detection.

2.4.1color Selection

$L*a*b*$ is commonly preferred over *RGB* or other color spaces, because it is one of the perceptually uniform colors paces which approximates the way that human perceive color. In $L*a*b*$ color space, $L*$ represents luminance, $a*$represents greenness-redness, and $b*$ represents blueness yellowness.

2.4.2. Fuzzy Inference System

Fuzzification of the inputs is achieved by using triangular membership functions for each component. A membership function is a curve that defines how each point in the input space is mapped to membership value between 0&1advantages*:* Fuzzy approach makes color histogram-based methods more robust and less sensitive to illumination changes and quantization errors. Output of our system consists of 15colors; therefore it has a computational advantage in

histogram comparison. The main advantage of the proposed fuzzy color histogram over a conventional color histogram is its accuracy. Since the system is less sensitive and more robust to illumination changes and quantization errors, it performs better on image retrieval. A sample image with different illuminations achieved through gamma correction and corresponding color histograms.

2.5. Efficient and Robust Shot Change Detection

Shot change detection, also called temporal segmentation is a crucial task in multimedia applications such as multimedia database management systems, automatic abstracting? We believe the process of shot change detection should be both efficient and robust to be widely useful. These two properties are the grounds of the proposed approach, which is based on relative, inter frame measures and thresholds on low resolution data in an illumination-invariant color subspace.

A shot is defined as a set of successive images obtained from a continuous acquisition of a single camera. It is often considered as the base unit in video analysis systems. Each shot is separated from the previous and the next ones by transitions. There exist two kinds of transitions: abrupt and progressive transitions. In an abrupt transition (also called a cut), the last frame of the first shot is directly followed by the first frame of the second shot. No effect has been inserted between the two shots. Discuss method optimal criteria and propose to use two support vector machine (SVM) classifiers to detect respectively cuts and gradual transitions.

2.5.1 Data Preprocessing

The shot change detection can be performed onUn compressed or compressed video sequences. The only difference is the way to obtain low resolution images, and more precisely images with a size 64 times lower than the original ones. The resolution reached is enough to visually detect the shot changes.

2.5.2 Colour Space Conversion

A colour space widely known to be related to the human vision system , namely the HSL space which is represented by three components: hue, saturation, and luminance (or value).Whereas the saturation and luminance are coded in a classical way (as scalars), the hue is an angular value. The hue represents the colour perceived (red, yellow, green,etc.), the saturation measures the purity of the colour (e.g. for a pink hue, the pink colour is characterized by a lower saturation than the red colour, whereas black, white, and grey colours are characterized by a null saturation), and the

luminance represents the grey level, from dark (minimum)to white (maximum).

2.5.3 Dissimilarity measure

We have presented here the dissimilarity measure. Which is used and we have justified the interest to use the variation of a dissimilarity measure computed between two successive frames instead of the measure itself. We will now present the shot change detection algorithm.

2.5.4 Detection Method

Shot change can be abrupt or progressive. Considering a progressive transition as abrupt one whose effects have been spread on several images, we propose a method to detect abrupt and progressive transitions in a relatively similar way.

2.6. Comparison of Video Shot Boundary Detection Techniques

A comparison of several shot boundary detection and classification techniques and their variations including histograms, discrete cosine transform, motion vector, and block matching methods.

2.6.1 Compression Differences

They used differences in the discrete cosine transform ~DCT! Coefficients of JPEG compressed frames as their measure of frame similarity, thus avoiding the need to decompress the frames. A further speedup was obtained by sampling the frames temporally and using a form of binary search to find the actual boundary. Potential boundaries were checked using a color histogram difference method.

2.6.2 Edge Tracking

Dissolves and fades were identified by looking at the relative values of the entering and exiting edge percentages. They determined that their method was more accurate at detecting cuts than histograms and much less sensitive to motion than chromatic scaling.

2.6.3 Motion Vectors

Motion vector information can also be obtained from MPEG compressed video sequences. However, the block matching performed as part of MPEG encoding selects vectors based on compression efficiency and thus often selects.In appropriate vectors for image processing purposes. We selected the following five algorithms for our test:

Histogram, region histograms, running histograms, Motion compensated pixel differences, DCT coefficient differences.

2.7. Shot Detection Methods

In this paper, an old and reliable method based on local histogram has been used to implement shot cut detector for real-time applications. Since software implementation on PC is not suitable for this algorithm due to the sequential treatments of the processor **.**Furthermore

the development of the hardware technology and communications infrastructure has made automatic analyzing of video content very challenging .This approaches in MPEG-7 standard and content based manipulation on video format. In this way to use the hierarchical video model. Method is shot boundary detection is the process of automatic detecting the boundaries between shots in video. Histogram approach across several types of video, in different color spaces, different types of quantization and sub sampling.

The experiments have shown that the gray space at four levels has presented reliable results and relatively low computation time.

3. Features and Approaches

A new cut detection algorithm with constant false -alarm ratio for video segmentation. One important task a radar system performs is target detection. The detection itself is fairly straightforward. It compares the signal to a threshold. Therefore, the real work on detection is coming up with an appropriate threshold This algorithm used in this method of content false alarm ratio (CFAR) detection refers to common form of adaptive algorithm used in radar system to detect the target returns against a background of noise, clutter and interference. CFAR Detection Using. Automatic Threshold Factor, Custom Threshold Factor. Cell averaging CFAR detector is probably the most widely used CFAR detector. It is also used as a baseline comparison for other CFAR techniques. In a cell averaging CFAR detector, noise samples are extracted from both leading and lagging cells (called training cells) around the CUT.
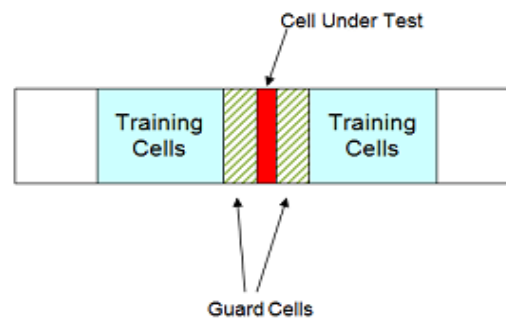

Fig 3 .Relation Among These Cells

Informally, two sets are close in the Hausdorff distance if every point of either set is close to some point of the other set. The Hausdorff distance is the longest distance you can be forced to travel by an adversary who chooses a point in one of the two

sets, from where you then must travel to the other set. In other words, it is the greatest of all the distances from a point in one set to the closest point in the other set.HDH Based Compressed Video Cut Detection this method can detect shot breaks accurately and efficiently. Using the edge features, this method can effectively decrease their influence of rapid changes in scene brightness. Using the Hausdorff distance histograms on sub regions and merging them up through multiple passes, this algorithm can robustly tolerate multiple object and camera motions. The scheme of performing the detection directly on the compressed domain leads to a significant computational speedup.

Approaches

Fuzzy logic can be used as an interpretation model for the properties of neural networks, as well as for giving a more precise description of their performance. We will show that fuzzy operators can be conceived as generalized output functions of computing units. Fuzzy logic can also be used to specify networks directly without having to apply a learning algorithm. Fuzzy systems can be represented as networks. The computing units must implement fuzzy operators a network with four hidden units. Each one of them receives the inputs $x1$, $x2$ and $x3$ which correspond to the fuzzy categorization of a specific number. The fuzzy operators are evaluated in parallel in the hidden layer of the network, which corresponds to the set of inference rules.

4 Conclusions

We have presented a review on recent developments in visual automatic abrupt shot boundary detection technique which detects cut transitions. The state of the art of existing approaches in each major issue has been described with the focus on the following tasks: video analysis including Gabor filtering, fuzzy color histogram, robust video detection, comparison of video shot boundary techniques and CBIR system. At the end of this survey, we have discussed future directions such as effective method of fuzzy rule based approach.
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