Chapter 11
Detection of Gradual Transition in Videos:
Approaches and Applications

Hrishikesh Bhaumik
RCC Institute of Information Technology, India

Siddhartha Bhattacharyya
RCC Institute of Information Technology, India

Manideepa Chakraborty
RCC Institute of Information Technology, India

Susanta Chakraborty
Indian Institute of Engineering Science and Technology, India

ABSTRACT

During video editing, the shots composing the video are coalesced together by different types of transition effects. These editing effects are classified into abrupt and gradual changes, based on the inherent nature of these transitions. In abrupt transitions, there is an instantaneous change in the visual content of two consecutive frames. Gradual transitions are characterized by a slow and continuous change in the visual contents occurring between two shots. In this chapter, the challenges faced in this field along with an overview of the different approaches are presented. Also, a novel method for detection of dissolve transitions using a two-phased approach is enumerated. The first phase deals with detection of candidate dissolves by identifying parabolic patterns in the mean fuzzy entropy of the frames. In the second phase, an ensemble of four parameters is used to design a filter which eliminates candidates based on thresholds set for each of the four stages of filtration. The experimental results show a marked improvement over other existing methods.

1. INTRODUCTION

Technological development in the field of multimedia and advances in internet technology along with low cost accessibility to computing resources has led to an increased interest in research on digital videos. This has also been augmented by the fact that memory and capturing devices have witnessed a downward surge in cost. Thus video processing and analysis has become an open area of research for the last few decades. Many new and innovative concepts are being proposed regularly so as to enrich

the field of content-based video retrieval (CBVR). The approaches and algorithms developed for CBVR, help to align computer vision in line with human perceptions. In course of defining content-based video retrieval, "content" stands for some features of images such as color, texture, shapes etc. and the term "retrieval" refers to intricate mathematical functions or techniques which can fetch results, relevant for the end user. Thus, content-based video retrieval can be elaborated as the search for videos, where the semantic content matches the query given by a user. In fact, the query given may be using any one of the media types, i.e. text, image, audio and video. In this era, there is an abundant amount of digital information in the form of videos related to music albums, news, documentaries, sports, movies etc. These are available publicly through online digital libraries and repositories. The main problem lies with the amorphous databases or repositories in which these videos are stored. This manifests the immense need for superior search engines which are capable of searching and retrieving videos based on any query media type i.e. text, image, audio, video or a combination of these. This sets the context for the goals with which content-based video retrieval systems are built. Also it enumerates the challenges that may be faced in this research domain.

The basic step towards video content analysis is the automated segmentation of a video into its constituent shots by applying algorithms developed for the purpose. This process is referred to as temporal video segmentation and forms the basis for applications related to video summarization, indexing etc. In other words, video segmentation can be defined as the process of grouping the contents of a video stream into meaningful and manageable fragments. Fragmentation of any video sequence into its constituent units is the prerequisite step for any video processing task. A video stream may be visualized as a conglomeration of a set of different scenes. Scenes in a video are clusters of successive shots having visual similarities. Hence, scenes are composed of shots having semantic similarity. Further scenes can be divided into its composing shots. A shot in a video is a sequence of consecutive frames captured continuously from a single camera having visual continuity. A shot consists of a sequence of temporally related frames. A set of representative frames may be selected which portray the visual content of the shot. These representative frames form the summary of the shot and are called key-frames. The hierarchical elucidation of video segmentation is given below in Figure 1. Shot boundary is the demarcation point which marks the end of one shot and the beginning of another shot. A shot boundary signifies distinct change in the visual contents of consecutive shots and represent discontinuity in high level features including edges, shapes etc. of objects in the spatial and temporal domains. Shot boundaries represent transitions in visual content which are incorporated at the editing stage of the video. The transition effects are categorized into two major categories i.e. abrupt and gradual transitions. In an abrupt transition there is an instantaneous transformation between two consecutive frames elucidated by a sudden change in the visual content of the video. Such abrupt transitions resulting from a change of camera are known as hard cuts and portray points of visual discontinuity. On the other hand, gradual transitions are the editing effects in which two or more shots are combined to enable a smooth changeover from one shot to the next. The change in visual content takes place slowly and continuously over a few frames. Fade-in, fade-out, wipe, whirls and dissolves are some of the types of gradual transitions. In case of wipe, one shot is gradually replaced by another shot using a geometric pattern moving across the screen. There are many types of wipe transitions such as, straight lines, complex shapes, split-screens, horizontal line wipes running from left, right or into the middle of frame. Fade-out transition is one in which one image is gradually replaced by a black screen or by some other image. Fade-in is just the opposite of fade-out in which a solid color or an image gradually gives way to a new image.

Related Content

On Generalized Fuzzy Entropy and Fuzzy Divergence Measure with Applications
Surender Singhand Sonam Sharma (2019). *International Journal of Fuzzy System Applications (pp. 47-69).*
www.irma-international.org/article/on-generalized-fuzzy-entropy-and-fuzzy-divergence-measure-with-applications/233586

Machine Vision Schemes towards Detecting and Estimating The State Of Corrosion
P. Kapsalas, M. Zervakis, P. Maravelaki-Kalaitzaki, E.T. Delegouand A. Moropoulou (2012). *Pattern Recognition and Signal Processing in Archaeometry: Mathematical and Computational Solutions for Archaeology (pp. 146-165).*
www.irma-international.org/chapter/machine-vision-schemes-towards-detecting/60874

Distribution of Artificial Intelligence in Digital Games
Shaun Downeyand Darryl Charles (2015). *International Journal of Intelligent Information Technologies (pp. 1-14).*
www.irma-international.org/article/distribution-of-artificial-intelligence-in-digital-games/139467

Discovering Mappings Between Ontologies
Vikram Sorathiaand Anutosh Maitra (2009). *Encyclopedia of Artificial Intelligence (pp. 494-500).*
www.irma-international.org/chapter/discovering-mappings-between-ontologies/10292

Streamlined Alarms for Intrusion Recognition System
V. Dhanakotiand R. Nedunchezhian (2015). *International Journal of Intelligent Information Technologies (pp. 40-54).*
www.irma-international.org/article/streamlined-alarms-for-intrusion-recognition-system/135905