A Content-Driven System Architecture for Tackling Automatic Cataloging of Animated Movie Databases

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ABSTRACT

This article discusses content-based access to video information in large video databases and particularly, to retrieve animated movies. The authors examine temporal segmentation, and propose cut, fade and dissolve detection methods adapted to the constraints of this domain. Further, the authors discuss a fuzzy linguistic approach for deriving automatic symbolic/semantic content annotation in terms of color techniques and action content. The proposed content descriptions are then used with several data mining techniques (SVM, k-means) to automatically retrieve the animation genre and to classify animated movies according to some color techniques. The authors integrate all the previous techniques to constitute a prototype client-server architecture for a 3D virtual environment for interactive video retrieval.

Keywords: 3D Video Browsing, Cut Detection, Dissolve Detection, Fade Detection, Fuzzy Sets, Video Segmentation, Video Retrieval

1. INTRODUCTION

Managing large collections of video materials is a tedious task as it requires processing huge amounts of data. A lot of efforts are done today to develop new intelligent indexing systems able to provide user-friendly search capabilities. The target is to attend a semantic level of description close to human perception, and thus, to render the task of finding video contents as simple as devising a textual query, e.g., “find me the sad movies, or find the outdoor scenes”.

Video indexing primarily involves content annotation, which basically means adding some
extra content-related information to the actual
data (e.g. indexes/attributes). This information
provides key-cues about the data content, al-
lowing thus the automatic cataloging. Content
annotation is mandatory, as non-indexed data
is practically inexistent for the system (and
eventually for the user) since there is no trace
of it. Most of the research in the field addresses
mainly the data annotation task, which is also
the most difficult to perform (Naphade &
Huang, 2002; Snoek & Worrall, 2005). The
challenge is to find methods to extract mean-
meaningful attributes, which tend to maximize
the relevance and the information coverage, while
minimizing the amount of data to deal with,
and thus the dimensionality of the data feature
space. Nevertheless, in order to be useful and
efficient, the annotation must be performed
automatically, without human intervention.

Unfortunately, because of the diversity of
the existing video materials, which involves a
large variety of specific processing constraints,
the issue of automatic understanding of video
contents is still an open issue. Despite some
few attempts (Chan, Qing, Yi, & Yueting, 2001;
Kim, Frigui, & Fadeev, 2008), there is still no
generic solution available for indexing all kind
of video materials. The chosen compromise
consists in reducing the high complexity of this
task by adopting some simplifying assumptions,
e.g. particular setups, “a priori” information,
hypothesis, etc., which are facilitated by the
specificity of each application domain. This
makes the existing systems highly applica-
tion dependent. Many domains have been
addressed, while new ones are still emerging,
e.g., basketball sequences (Saur, Tan, Kulkarni,
& Ramadge, 1997), soccer sequences (Leon-
ardi, Migliorati, & Prandini, 2004), medical
sequences (Fan, Luo, & Elmagarmid, 2004),
news footage (Lu, King, & Lyu, 2003), TV
programs (Kawai, Sumiyoshi, & Yagi, 2007),
animal hunt in wildlife documentaries (Haering,
Qian, & Sezan, 2000), etc.

In this article we tackle the indexing issue
for a new application domain, which becomes
more and more popular: the animated movie
entertainment industry. While the very few exist-
ing approaches are limited to dealing either with
the analysis of classic cartoons or with cartoon
genre detection (Roach, Mason, & Pawlewski,
2001; Snoek & Worrall, 2005; Ianeva, Vries,
& Rohrig, 2003; Geetha & Palanivel, 2007),
our approach is different as it uses fuzzy color-
based and action-based content descriptions
to retrieve animated movies according to their
artistic content.

One reference in the field is IAFF - The
International Animated Film Festival (CITIA,
2009), which stood as validation platform for
our approaches. CITIA, the company managing
the festival, has composed one of the world’s
first digital animated movie libraries. Today, this
library accounts for more than 31.000 movie
titles, 22.924 companies and 60.879 profession-
als, which are to be available online for a general
and professional use. For the moment, the exist-
ing indexing capabilities for animated movies
(the CITIA Animaquid Indexing System) are
limited to use only textual information (e.g.,
synopsis, descriptions, etc.), provided mainly
by movie authors, which in many cases do not
totally apply to the rich artistic content of the
animated movies.

Animated movies are different from con-
tventional movies and from cartoons in many
respects which should be particularly addressed,
(Ionescu, Coquin, Lambert, & Buzuloiu, 2008,
see Figure 1):

- we mainly deal with fiction or abstract
  movies and therefore, there usually are
  no physical rules;
- characters, if any, can take any shape or
  color;
- depending on the animation technique,
  the motion could be discontinuous;
- a large variety of animation techniques
  are employed;
- usually, there are a lot of color effects;
- the movies are artistic creations, there-
  fore artistic concepts are used, e.g. paint-
  ing concepts, theatrical concepts, etc.;
- colors are selected and mixed by the art-
  ists to express particular feelings or to
  produce particular sensations;
Virtual Magnifier-Based Image Resolution Enhancement

[www.igi-global.com/article/virtual-magnifier-based-image-resolution/51653?camid=4v1a](www.igi-global.com/article/virtual-magnifier-based-image-resolution/51653?camid=4v1a)