



CS365A - ARTIFICIAL INTELLIGENCE COMPUTER SCIENCE ENGINEERING IIT KANPUR, 2013-14.

Feb 28, 2014

Project Proposal

By:

Anjani Kumar(11101)
Sumedh Masulkar(11736)
{anjanik, sumedh}@iitk.ac.in

Guided By:

Prof. Amitabha Mukerjee

“Automatic Highlights Extraction in Cricket”

Introduction and Motivation

Sports video highlights extraction is a popular topic. Compared to other video types, news or movies, sport videos have well defined content structure and domain rules. A sports video usually has a long period, but only few segments of the video attracts viewers. These are certain highlights which are interesting to us. Cricket is second most watched sport after soccer. And our interest in cricket was another motivating factor. Our aim is to build a automated tool which given a complete video of a sport(we will be aiming cricket) can extract highlights containing only interesting events.

Related Works

Researchers have focused highly on the emerging and promising field of sports highlights extraction recently. Since games are rule based and predictable, highlight extraction is more the extraction of the interesting events such as a wicket or a six or a boundary in cricket, a goal or a red card in soccer, and so on. Hence, many domain-specific and knowledge based techniques have been employed for event detections and extracting highlights for cricket.

Automatic generation of cricket highlights using Hidden Markov Model(HMM) was proposed in [1][2][3]. [3] fused in audio information in addition to motion information. Whereas in [4], the author proposed an unsupervised event discovery and detection framework with use of color histogram(CH) or histogram of oriented gradients(HOG), which can potentially be generalized to different sports. The unigram and bigram statistics of detected events are then used to provide a compact representation of the video. [5] presented another novel approach towards highlights generation of sports videos by extracting events and semantic concepts. The method extracted

event sequence from video and classifies each sequence into a concept by sequential association mining. The extracted concepts and events are then selected according to their degree of importance. This was further improved in [6].

[6] presented a hierarchical framework and effective algorithms for cricket event detection and classification, which avoids shot detection and clustering. Extraction was divided into multiple levels(described in approach below).

[7] again used shot detection techniques, and text processing on the commentary to identify action in each ball.

Approach

We are primarily going to follow the work done in [6].

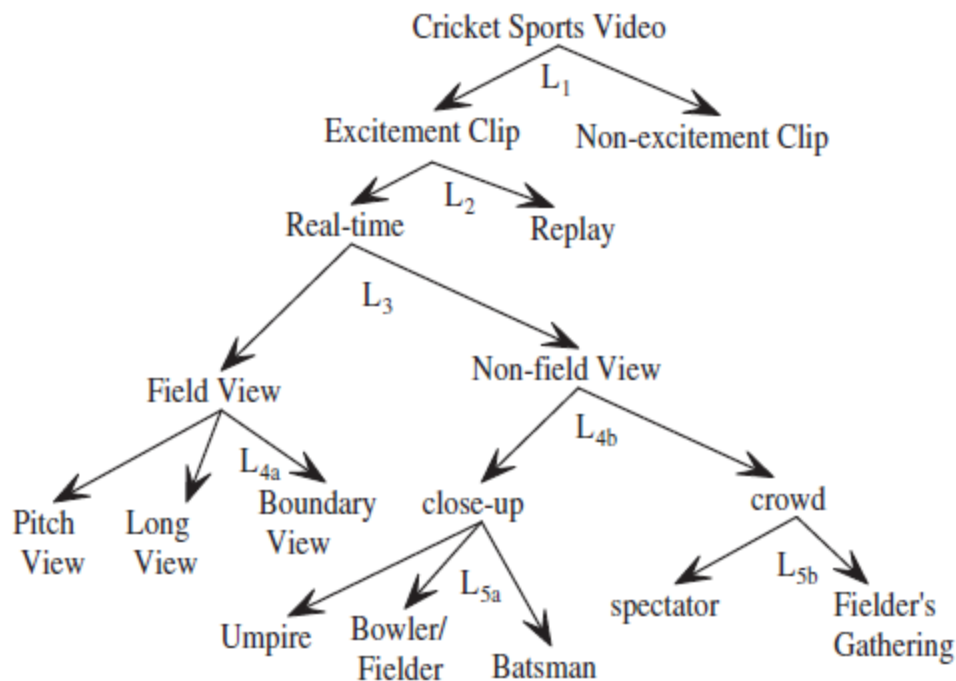


Figure 1. Tree Diagram of Hierarchical Framework

(Image taken from [6])

- As can be seen in the diagram, there are 5 levels in the hierarchy.
- Level 1 - Excitement detection: A particular video frame is considered as an excitation frame if product of its audio excitement and zero crossing rate(ZCR) exceeds a certain threshold.

- Level 2 - Replay Detection: Replay segment is sandwiched by two logo transitions. Hence, replays can be detected using Hue-Histogram Difference(HDD) and removed.
- Level 3 - Field View Detection: Dominant Grass Pixel Ratio(DGPR) is calculated for a view, which varies between 0.16 to 0.24 for the field view. Thus, a non-field view can be removed.
- Level 4 - Field View and Close Up Detection: Percentage of field pixels in regions are calculated and some thresholds are fixed, and frame can then be classified as long-view, boundary view or pitch view. Similarly, edge pixels are used to detect close views or crowd views.
- Level 5 - Fielders gathering or crowd Detection: Crowd frames are removed from the video. The detection is done by computing histogram distance of hue-histogram of frames.
- Thus, highlights for the given video are extracted.

Resources and Datasets

- ❖ [6] - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4756096>
- ❖ Videos of cricket matches available on youtube will be our datasets.
- ❖ Dataset used in [7] available at <http://cse.iitk.ac.in/~vision/dipen/>.

References

- [1] Kamesh Namuduri. "Automatic extraction of highlights from a cricket video using MPEG-7 descriptors".
- [2] Jinjun Wang, Changsheng Xu, Engsiong Chng, Qi Tian. "Sports Highlight Detection from Keyword Sequences Using HMM", in *Proceedings of the International Conference on Multimedia and Expo, 2004*.
- [3] Chih-Cheih Cheng, Chiou-Ting Hsu. "Fusion of Audio and Motion Information on HMM-Based Highlight Extraction for Baseball Games", in *Proceedings of the IEEE Transactions on Multimedia, vol. 8, no. 3, June 2006*.
- [4] Hao Tang, Vivek Kwatra, Mehmet Emre Sargin, Ullas Gargi. "Detecting Highlights in Sports Videos: Cricket as a test case", 2011.
- [5] Maheshkumar H. Kolekar, Somnath Sengupta. "Semantic concept mining in cricket videos for automated highlight generation", 2009.
- [6] M. H. Kolekar, K. Palaniappan, S. Sengupta. "Semantic Event Detection and Classification in Cricket Video Sequence", in *Proceedings of the Indian Conference on Computer Vision, Graphics & Image Processing, 2008*.
- [7] Dipen Rughwani. "Shot Classification and Semantic Query Processing on Broadcast Cricket Videos". <http://cse.iitk.ac.in/~vision/dipen/>.