International Journal of Innovative
Computing, Information and Control
Volume **6**, Number **6**, June **2010**

 ISSN 1349-4198
pp. **2787–2801**

PLAYFIELD SEGMENTATION FOR BASEBALL VIDEOS USING ADAPTIVE GMMS

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Received January 2009; revised May 2009

Abstract. *Playfield is one of main parts appearing in typical scenes of sports videos. The segmentation of playfield is essential because it usually offers important cue of higher-level content in sport videos. The colors in playfield may change significantly due to variation of illumination, which thus results in a large amount of segmentation errors for color-based segmentation schemes. In this paper, we present a new playfield segmentation method for baseball videos based on an adaptive Gaussian Mixture Model (GMM). The Expectation Maximization (EM) algorithm is used to train the model parameters. An adaptive GMM model is constructed by a novel training sample selection, which automatically selects appropriate samples from input video for the parameter estimation of EM process. The simulation results indicate that the new method achieves very low error rates of segmentation in an efficient manner.*
Keywords: Gaussian mixture model, EM algorithm, Playfield segmentation

1. **Introduction.** Recently, sport video is more and more popular for audiences and the available content in various networks is increasing rapidly. If the sport videos are effectively annotated, users can then retrieve any highlights or important events efficiently and precisely on a later date. Therefore, automatically extracting high-level information from sport video, which is consistent with human semantic, is crucial to develop efficient retrieval or summarization system.

Playfield occupies the main part of the typical scenes of sport videos. Generally, the sports are playing on playfield, which has a standard specification for each sport. Almost all important events of sports, such as hit or homerun in baseball game, happen in the playfield. In addition, the change of features of playfield is often related to the change of events. Therefore, by extracting the features of the playfield, the identification or classification of high-level events or highlights of sports can then be achieved. Thus, the playfield segmentation is the basis of high-level processing of sport video, and then becomes an important and even essential preprocessing of higher semantic analysis for sport videos.

Moreover, typical scenes are full of semantic meanings which are helpful to detect high-level events. Thus, the scene classification becomes an important issue to analyze sports video, such as scene-based event detection. In [1-5], authors have studied the relationship between scene and event. Therefore, playfield is usually chosen as the important feature for scene analysis.