Shot boundary detection based on orthogonal polynomial

ABSTRACT

Shot boundary detection (SBD) is a substantial step in video content analysis, indexing, retrieval, and summarization. SBD is the process of automatically partitioning video into its basic units, known as shots, through detecting transitions between shots. The design of SBD algorithms developed from simple feature comparison to rigorous probabilistic and using of complex models. Nevertheless, accelerate the detection of transitions with higher accuracy need to be improved. Extensive research has employed orthogonal polynomial (OP) and their moments in computer vision and signal processing owing to their powerful performance in analyzing signals. A new SBD algorithm based on OP has been proposed in this paper. The Features are derived from orthogonal transform domain (moments) to detect the hard transitions in video sequences. Moments are used because of their ability to represent signal (video frame) without information redundancy. These features are the moments of smoothed and gradients of video frames. The moments are computed using a developed OP which is squared Krawtchouk-Tchebichef polynomial. These moments (smoothed and gradients) are fused to form a feature vector. Finally, the support vector machine is utilized to detect hard transitions. In addition, a comparison between the proposed algorithm and other state-of-the-art algorithms is performed to reinforce the capability of the proposed work. The proposed algorithm is examined using three well-known datasets which are TRECVID2005, TRECVID2006, and TRECVID2007. The outcomes of the comparative analysis show the superior performance of the proposed algorithm against other existing algorithms.

Keyword: Shot boundary detection; Temporal video segmentation; Hard transition; Abrupt transition; Orthogonal polynomial; Orthogonal moments