지역적 정보를 이용한 장면 전환 검출

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Scene Change Detection Using Local Information

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요 약

본 논문은 지역의 의사 결정 트리와 클러스터링을 사용하여 장면 전환 검출 방법을 제시한다. 지역 의사 결정 트리는 클러스터 경계선 검출 장면과 그 인접 프레임의 사이의 차이 값을 시간 유사 분포를 비교하기 위해 같은 방식으로 검출하고, 그리고 클러스터 단위로 차이 값의 유사성과 그룹 프레임의 끊어지지 않는 시퀀스를 감지한다.

ABSTRACT

This paper proposes a Scene Change Detection method using the local decision tree and clustering. The local decision tree detects cluster boundaries wherein local scenes occur, in such a way as to compare time similarity distributions among the difference values between detected scenes and their adjacent frames, and group an unbroken sequence of frames with similarities in difference value into a cluster unit.

키워드

의사 결정 트리(Decision Tree), 클러스터링(Clustering)

Ⅰ. Introduction

Video segmentation refers to Scene Change Detection wherein images, texts, and audio in the media are analyzed according to their features, and are classified in a hierarchical manner to ensure the video is hierarchically structured. Over the past few decades, a lot of Scene Change Detection techniques have been proposed [1, 2]. One of the most common methods for Scene Change Detection is to compare the difference values for specific features among an unbroken sequence of frames. Despite its relatively high accuracy, this method is limited in its ability to ensure robustness [3].

In this paper, the Scene Change Detection method based on the local decision tree features the use of local X2-histograms and normalization expressions. Local scenes are followed by the occurrence of global scenes - a process of detecting various scene changes following a scene change detection. Local scenes stay within the current scene until a new scene is detected. In addition, local scenes have multiple scene changes, so difference values need to be grouped by local thresholds into clusters. Figure 1 shows a graph of the overall numerical formula structure that is used for Scene Change Detection.

Ⅱ. Proposed Histogram

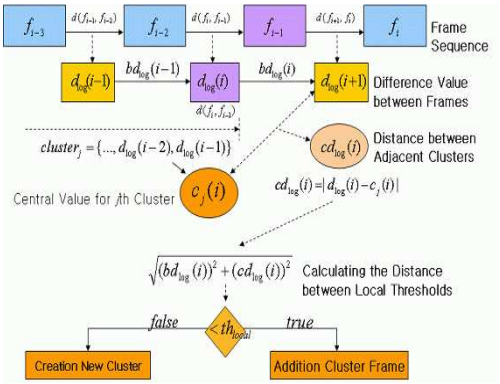

Fig. 1. A Numerical Structure Based on the Local Decision Tree

Ⅲ. Experiment

Local scenes involve a process wherein clusters are created by the local decision tree from the difference values for a sequence of frames at the point where scenes are detected.

If the difference value (bdlog(i)) between the current frame and its preceding frame falls below a threshold (klocal), and the difference distance (bcdlog) for the preceding cluster (cdlog(i)) exceeds a local threshold (thlocal), a new cluster is created. Otherwise, local scenes are grouped into a preceding cluster. As illustrated in Figure 2, different thresholds are compared to detect global scene changes.

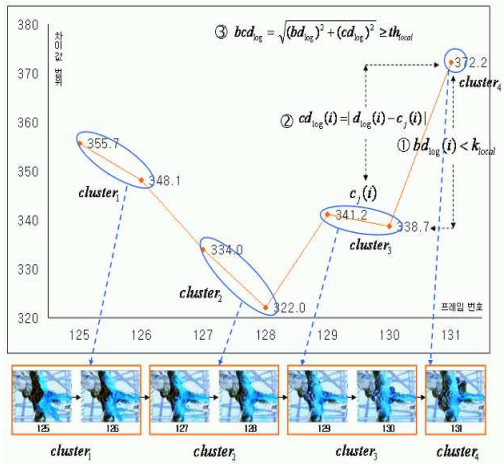

Fig. 2. A Comparison of Thresholds for Detecting Local Scene Changes

Figure 3 shows all the frames, central values, and numbers of the clusters ({c5, c6, c7}, {c21, c22}, {c24, c25, c26})) with time similarity in the case that the central values for the clusters meet a threshold (≥380).

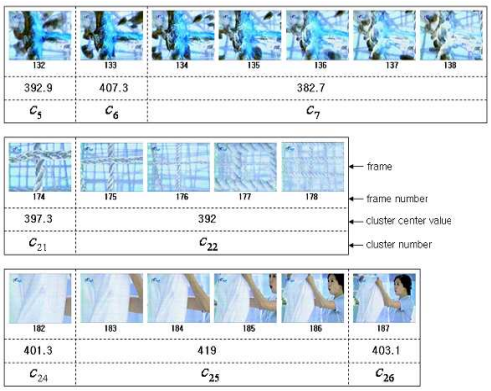

Fig. 3. The Construction of the Clusters Meeting a Central Value (≥380)

Ⅳ. Conclusion

A scene is initiated at the point where a scene change is detected. At the point where the scene starts, the local decision tree constructs the clusters based on the similarity in frames' difference values, and on the central values for adjacent clusters. Clustering continues until another scene change sequence is detected

Acknowledgement

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Reference

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