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Techniques for Effective Video Coding for the Best Repeated Frame Compensation

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Abstract*: A large amount of storage and bandwidth is needed when data transmission is done using uncompressed digital video. This results in a large amount of data that demands the need of video compression. Many of the existing video compression standards share common or similar coding tools, and there is currently no explicit way to exploit such commonalities at the level of implementations. Moreover, the possibility of taking advantage of the continuous improvements in coding is only possible by replacing the existing approach with a new one. This paper proposes an efficient video content representation by exploiting the temporal redundancies using optimal extraction of repeated frames and scenes. A new standard for video coding called Optimal Repeated Frame Compensation (ORFC) is used, in which the repeated frames are combined together to form a single frame in order to reduce the total number of frames.*

Keywords: *Compression, fidelity, key frame extraction, pixel prediction, video coding*

I. INTRODUCTION

A video is said to be a collection of several images. Each image is called frames and the amount of images shown per second is called Frames Per Second (FPS). A video can be represented by numerous consecutive frames, each of which corresponds to a constant time interval. Two or more sequences in a video represent the same scene with different view point. Therefore, the two sequences are related with each other though they are different. However, such a representation is not adequate for new emerging multimedia applications, such as content-based indexing, retrieval, and video browsing. Moreover, tools and algorithms for effective organization and management of video archives are still limited. As the video data originate from the same scene, the inherent similarities of the image are exploited for efficient video compression. Key frame extraction, is an essential part in video analysis and management, providing a suitable video summarization for video indexing, browsing and retrieval. The use of key frames reduces the amount of data required in video indexing and provides the framework for dealing with the video content in an efficient way. Key frame is the frame which can represent the salient content and information of each shot. The key frames extracted must summarize the characteristics of the video, and the image characteristics of a video can be tracked by all the key frames in time sequence. The efficient representation of video content at key frames level is crucial, for video copy detection as they don't meet specific requirements. As a result, simple approaches of low complexity are usually preferred. Generally, key frame extraction techniques can be roughly categorized into Sequential and Cluster-based methods [1]. In sequential methods, consecutive frames are compared in a sequential manner. The key frames are detected depending on the similarity with either the previous frames or the previously detected key frame. The main disadvantage is that, this method computes only the similarity between adjacent frames and ignores the overall change trend in the shot range. In cluster-based methods, the frames are grouped into a finite set of clusters in the selected feature space [2], and then the key frame set is obtained by collecting the representatives of each cluster group. In this method, key frames are selected regardless of the temporal order of each frame. If key frames are extracted for each shot independently and the scenery changes slowly in each shot, cluster-based methods are able to provide an understanding of the overall visual content of a video. In this paper, a novel key frame extraction method is proposed. Compared with other existing methods, the proposed approach has two main characteristics: (1) it extracts the key frames using a simplified algorithm called 'Optimal Repeated Frame Compensation (ORFC) (2) the ORFC uses an adaptive key frame extraction method in which the repeated frames are combined together to form a single frame in order to reduce the number of frames. It then employs the local features to further refine key frame candidates, which helps the system to get high quality key frames. Rather than coding each entire picture repeatedly, video can be represented more effectively by coding only the changes present in the video content. This ability to use the temporal-domain redundancy to improve the coding efficiency is what fundamentally distinguishes the proposed system from other existing methods.

II. Proposed Method

This approach proposes a method to identify and visualize repetitive structures in frames using ORFC. The repeated frames are combined together to form a single frame in order to reduce the number of frames. It is mainly used to identify repetitions in a frame. For extracting limited and meaningful information of video data, an adaptive video content framework is proposed in this paper. Fig.2.1 illustrates the block diagram of the proposed method, consisting of four modules: video detection, video sequence analysis, classification, and key frame extraction. The first three modules are mainly used to produce a feature vector representation of the video sequence by first segmenting it into distinct video shots [3]. Such a representation provides a more meaningful description of the video content and, therefore, key frame extraction can be implemented more efficiently. The frame difference is calculated mainly on the basis of two classifications. One is enhanced pixel prediction and other one is temporal prediction. Both help to extract frames in an efficient way by exploiting the inherent similarities among adjacent frames.

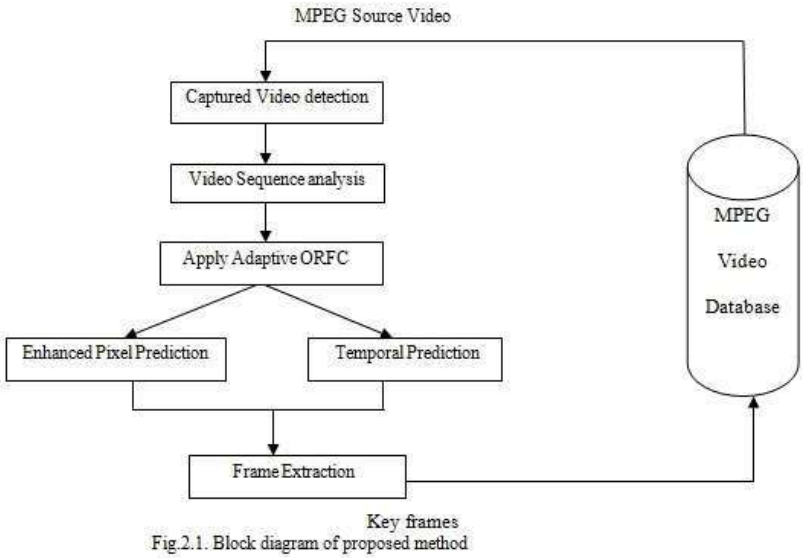

Fig.2.1. Block diagram of proposed method

III. CONCLUSION

In this paper, a mechanism for automatic extraction of the most representative frames in video databases is proposed. A minimization of the frames repeated has been done here using an optimization technique called ORCP. This technique is used for indicating the most characteristic frames within each selected block. To accomplish the optimal extraction, first a detailed analysis of frames extracted has been studied in order to obtain an image representation more suitable for classification. It has been seen that the proposed method is valid to segment the shot and to extract key frames in an optimal way. It gives good feasibility and strong robustness

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