ROBOTIC PERFORM SIMILAR IMAGE PATCH MATRIX FOR HIGH EFFIENCY VIDEO COMPRESSION

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Abstract

The aim of this study was removed noise in compressed video. Nonlocal Adaptive loop Filter based on the low-rank constraint, which estimates threshold for every group of image patches. The picture is first divided into image patches, and for each patch find the K most similar patches to form an image patch group, which is rearranged into a matrix. The compression artifacts are reduced by jointly minimizing the mean square errors between reconstructed samples and original samples and the rank of similar image patch matrix. Non local adaptive filter and high efficiency video coding techniques performed. In comparison to AVC, HEVC offers about double the data compression ratio at the same level of video quality, or substantially improved video quality at the same bit rate.

Keywords: *Non-Local, Video Coding, HEVC, MPEG-H, H.265/AVC*

I. Introduction

BLOCK-BASED transforms have been widely used in most popular video coding standards, e.g., H.264/AVC and HEVC, because it can exploit the correlation among pixels and hence improve the performance of video communication systems. Due to coarse quantization and motion compensation, many compression artifacts are introduced at medium and low bit rates, such as blocking, ringing and blurring artifacts. In-loop filters have become essential video coding tools, which not only can improve the quality of decoded frames directly by reducing the compression artifacts, but also provide high quality reference frames for succeeding pictures to directly save coding bits by motion compensation. The first in-loop filter adopted into video coding standards is de blocking filter (DF) in H.264/AVC, which applies a set of low-pass filters to 4×4 block boundaries adaptively based on the characteristics of reconstructed samples on both sides of block boundaries, and coding information, such as prediction modes and motion vectors. Although additional computational complexity is introduced, DF can obviously improve the subjective quality of decoded videos and achieve significant bit-rate saving. The latest generation video coding standard, High Efficiency Video Coding (HEVC), also adopts the de blocking filter as the first in-loop filter, which is extended to be performed on 8×8 block boundaries to reduce the number of de blocking operations. Besides the de blocking filter specially designed for blocking artifacts, HEVC further adopts another nonlinear in-loop filter, Sample Adaptive Offset (SAO), to further reduce the coding artifacts after de blocking filter.

SAO derives offset values for different regions of reconstructed frames from DF by minimizing mean sample distortions with original images, and modifies reconstructed samples by conditionally adding the corresponding offset value to each sample after the application of the de blocking filter. These offset values need to be coded and transmitted to decoders. Adaptive Loop Filter (ALF) had ever been adopted as the third in-loop filter after SAO in the early stage of HEVC, which is a Wiener-based adaptive filter to minimize the mean square errors between original samples and reconstructed samples from SAO. In order to adapt to different image structures, ALF derives up to 16 filters for different areas of luminance component. Similar with SAO, the derived filter parameters need to be transmitted to decoders, which will introduce a relatively large overhead. To achieve better coding performance, these areas are further merged based on rate-distortion (RD) costs at encoder side to reduce the number of filters, which can reduce the overhead of ALF but also decreases the adaptability of ALF for different image content.

II. Existing System

First introduced NLM filter into HEVC to compensate the shortcomings of the existing in-loop filters only based on image local smoothness prior models. The NLM filter takes weighted average of nonlocal similar image patches to reduce compression artifacts, where the weights are determined by the similarity of image patches located at the source and target coordinates.

Existing in-loop filters only based on image local smoothness prior models. The compression noise is obviously correlated with image signals, which is mainly caused by quantizing transform coefficients in block-based hybrid video coding. Low performance can occur. Existing image de noising work with low-rank constraint mainly focuses on dealing with general noise, such as Gaussien noise and impulse noise**.**

III. Proposed System

The proposed in-loop filter is named as nonlocal adaptive loop filter (NALF).There are three loop filters can performed in this NALF method. These are de blocking filter (DF), sample adaptive offset (SAO) and adaptive loop filter (ALF), which take effects sequentially on reconstructed pictures. The proposed nonlocal adaptive loop filter is also reconstructed picture module into divided image patches.

Modules Description

1. Input Video Acquisition

In this model, the user can upload the videos. The Video can be obtained for lesions of any size, shape, and composition in an acceptable amount of time and then filtration the Video to remove the noise and segment the video based on similarities. In this module, user can upload the cover image and video which is hiding in cover image. Then read the image as pixel format and video as video format. user can upload any type of video.

2. Preprocessing

The preprocessing state process the input image before post processing. The goal of the filter is to filter out noise that has corrupted image. It is based on a statistical approach. Typical filters are designed for a desired frequency response. The filtering is a nonlinear operation often used in image processing to reduce "salt and pepper" noise. A filter is more effective than convolution when the goal is to simultaneously reduce noise and preserve edges.

3. NLAF

To propose a nonlocal adaptive loop filter based on the low-rank constraint, which estimates threshold for every group of image patches. Estimate the standard deviation of compression noise based on three factors, i.e., the statistical characteristics of reconstructed samples, quantization parameters (QP) and coding modes (i.e., intra/inter coding), and find the best global parameter, c, for different coding modes.

4. Similarity Patching

In this module, a reconstructed picture is first divided into image patches, and for each patch we find the K most similar patches to form an image patch group, which is rearranged into a matrix. The compression artifacts are reduced by jointly minimizing the mean square errors between reconstructed samples and latent original samples and the rank of similar image patch matrix.

5. Video Compression

The HEVC method used to video compression. In principle, a motion picture is rapid sequence of a set of frames in which each frame is a picture. In other words, a frame is a spatial combination of pixels, and a video is a temporal combination of frames that are sent one after another Compressing video, then, means spatially compressing each frame and temporally compressing at a set of frames.

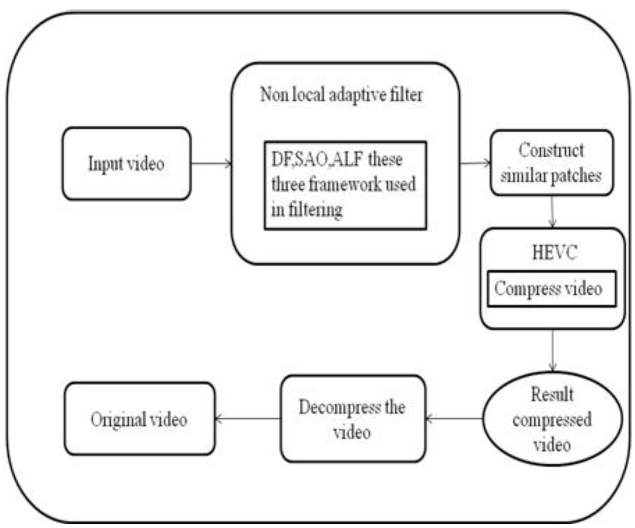

Fig1 Overall Architecture Diagram

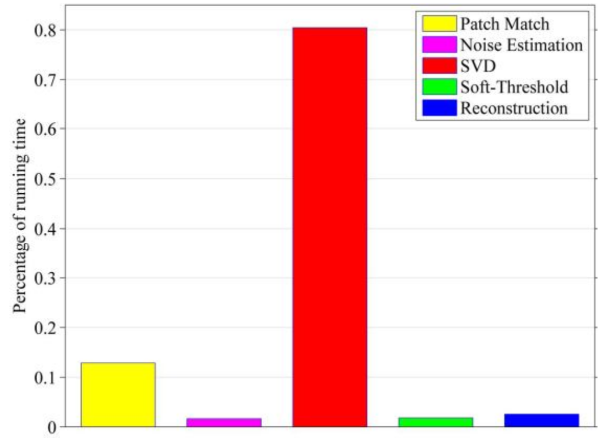

Fig 2. Percentage of Running Time for the Main Modules in the NALF

The quality of marked decrypted video is compared in the term of HEFC. The graph plots the HEFC a results of different marked decrypted images under given embedding rates. Out of fairness, we modify the methods with error-correcting codes to eliminate errors. By introducing an error-correcting code, the pure payload is reduced from existing method, where is the binary entropy function with error rate. Take test image Baboon for instance. If each embedding block is sized of 8 with error rate 15.55%, then the pure payload is 1543 bits rather than 4096 bits. As for the method, we only choose those results with a significantly high probability of successful data extraction and perfect image recovery to draw the curves it can be observed that over all range of embedding rate, for all cases, our approach outperforms state-of-the-art NALF algorithms in encrypted images. The gain in terms of PSNR is significantly high at embedding rate range that the methods can achieve.

IV. Conclusion

The Non local adaptive filter and high efficiency video coding techniques performed in input video. That input video is successfully removing noise and effetely compress the video. High Efficiency Video Coding (HEVC), also known as H.265 and MPEG-H Part 2, is a video compression standard, one of several potential successors to the widely used AVC (H.264 or MPEG-4 Part 10). In comparison to AVC, HEVC offers about double the data compression ratio at the same level of video quality, or substantially improved video quality at the same bit rate. It supports resolutions up to 8192×4320, including 8K UHD homology of H.265 techniques. Experimental results show that the proposed nonlocal adaptive loop filter can further improve the compression performance for HEVC, especially for video sequences with lots of similar structure patterns.

V. References

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