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3D-HEVC CODING FOR MIIR VIDEOS MANIPULATED BY DWT AND CLAHE METHOD

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ABSTRACT

Multi-Intensity Illuminated Infrared (MIIR) video is a new type of infrared video which solves the problem of improper illumination condition for ordinary infrared cameras for nighttime surveillance.In this paper we using DWT technique to improve the intensity level of the image.By improving intensity level we get the clear view of the image.Video enhancement is one of the most important and difficult components in the video research.The aim of the video enhancement is to improve the visual appearance of the video.In this paper we use CLAHE technique for video enhancement.Time varying intensity makes it hard to compress the video.In this paper we use MV-HEVC and 3D-HEVC video coding standards,which are originally designed for Multi-view and 3D video coding to compress the MIIR videos.The coding structures of MV and 3D-HEVC can be employed to compress the MIIR video in more efficient way compared with simulcast HEVC coding in the enhancement layers.

INTRODUCTION

For nighttime surveillance, infrared (IR) illumination is often employed. In order to obtain a reasonable image quality for effective surveillance, proper illumination condition plays a key role. However, an ordinary IR-illuminator has a fixed power level. Under-exposure image will be captured for faraway objects if the power level is too low, which will be unclear and hard to perceive.

On the other hand, objects near the camera will suffer from over-exposure, and significant loss of details, if the power level is too high. To address the above two different issues simultaneously, multi-intensity infrared (MIIR) illuminators which can periodically emit infrared light of different power levels.So that we improve the video quality by using DWT technique and CLAHE technique.

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BLOCK DIAGRAM

READ THE INPUT VIDEO

↓

CONVERT THE INPUT VIDEO INTO FRAMES

↓

APPLY DWT AND CLAHE TECHNIQUE

↓

GET THE ORIGINAL VIDEO BY USING IDWT

↓

COMPARE THE IMAGES

↓

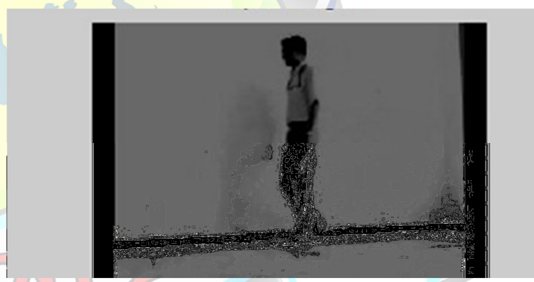
COMPRESS THE VIDEO BY USING 3D-HEVC

MULTI-INTENSITY ILLUMINATEDINFRARED VIDEOS

Unlike an ordinary IR-illuminator which uses a fixed power level to generate a constant illumination intensity , the power of a multi-intensity IR-illuminator video periodically so as to establish various illumination conditions.

The MIIR videos used in this paper are captured by an ordinary infrared camera equipped with a six-intensity IR-illuminator, with the illumination intensity decaying near exponentially from the brightest level to the darkest one in each period.Since the illumination and the video capturing process are synchronized by hardware , exactly SIX frames labeled from Ito 6 can be captured for each period. For synchronized MIIR videos, there are fixed number of frames in each illumination period.

Input image



Object Clearly Observed High Illumination Image

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DWT

In numerical analysis and functional analysis, a discrete wavelettransform (DWT) is any wavelet transform for which the wavelets are discretely sampled.

As with other wavelet transforms, a key advantage it has over Fourier transforms is temporal resolution: it captures both frequency and location information.

In wavelet analysis, the Discrete Wavelet Transform (DWT) decomposes a signal into a set of mutually orthogonal wavelet basis functions. These functions differ from sinusoidal basis functions in that they are spatially localized – that is, nonzero over only part of the total signal length. Furthermore, wavelet functions are dilated, translated and scaled versions of a a common function φ, known as the mother wavelet. As is the case in Fourier analysis, the DWT is invertible, so that the original signal can be completely recovered from its DWT representation.

CLAHE

Contrast Limited AHE (CLAHE) differs from ordinary adaptive histogram equalization in its contrast limiting. This feature can also be applied to global histogram equalization, giving rise to contrast limited histogram equalization (CLHE), which is rarely used in practice. In the case of CLAHE, the contrast limiting procedure has to be applied for each neighborhood from which a transformation function is derived. CLAHE was developed to prevent the overamplification of noise that adaptive histogram equalization can give rise to.

This is achieved by limiting the contrast enhancement of AHE. The contrast amplification in the vicinity of a given pixel value is given by the slope of the transformation function. This is proportional to the slope of the neighborhood cumulative distribution function (CDF) and therefore to the value of the histogram at that pixel value. CLAHE limits the amplification by clipping the histogram at a predefined value before computing the CDF. This limits the slope of the CDF and therefore of the transformation function. The value at which the histogram is clipped, the so-called clip limit, depends on the normalization of the histogram and thereby on the size of the neighborhood region.

COMPRESSION

Firstly, direct encoding of the rawMIIRvideo using plain HEVC codec is regarded as baseline in Secondly, after separating the MIIR video into sub-videos, each with constant illumination condition as mentioned above, an intuitive way of encoding the video is to use the simulcasting HEVC in which each sub-video is independently encoded to generate independent bit-streams.Through simulcasting, the HEVC encoding in each video will be more efficient than the plain HEVC because it is easier to make successful inter-frame prediction when the reference frames have similar brightness as the current frame. Consequently, the overall performance is expected to be improved over that obtained withplain HEVC encoding.

Image compression is minimizing the size in bytes of a graphics file without degrading the quality of the image to an unaccepted level.The reduction in file size

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allows more images to be stored in a given amount of disk or memory space.There are several different ways in which image files can be compressed.Image compression is a type of data compression applied to digital images to reduce their cost for storage or transmission.Algorithm may take advantage of visual perception and the statistical properties of image data to provide superior results compared with generic compression methods.Image compression is the process of encoding converting an image file in such a way that it consumes less space than original file.Web page images and high resolution digital camera photos are also be to compressed to save storage space and reduce transmission time .Compression can reduce the transmission time by a factor of around 2 to 10 or more.Similarly number of uncompressed full color images that an 8 megapixel digital camera can store on a 1GB memory card can be increased.The image compression system is composed of 2 distinct functional component an encoder and decoder.encoder performs compression decoder performs decompression.

MV-HEVC and 3D-HEVC encoding

In addition to applying simulcast coding to exploit the brightness similarity of frames within the same channel, image frames in nearby channels may also be used for prediction since their time instances are more close (±l frame in image capturing) to the current frame compared with the input image.

Previous/next frame in the same channel (± 6 frames for a 6-channel MIIR video), even though nearby channels will have different brightness levels.

For MV-HEVC and 3D-HEVC, as introduced in Sec. I, video frames of different views are encoded at the same time with the inter-view prediction enabled. Therefore, to adopt MV-HEVC and 3D-HEVC for further improvement of the compression performance of MIIR videos, we proposed to arrange each channel of MIIR video as a different view in the corresponding coding frameworks. Thus the inter-view prediction will be adapted as "inter-channel" prediction for the MIIR video to improve the compression performance.

Accordingly, when applying MV-HEVC on MIIR video, split channels of the video are simply regarded as different image views, with proper alignment of time instances, before they are fed into the MV - HEVC coding framework, as illustrated . On the other hand, 3D-HEVC contains more coding tools such as illumination compensation and disparity vector reference to compensate the relatively differences of imaging results among cameras when they are pointing toward the same object from different view angles in a multi-camera capturing scenario. Thus, we also plan to exploit these abilities of 3D-HEVC in this paper to furtherimprove the compression performance of the MIIR videos. However, MIIR videos, which are captured by a single camera, do not come with depth maps that are required as an input stream in 3D-HEVC for the final output frame synthesis. Fortunately, the current 3D- HEVC

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standard also allows the texture-only coding mode so we disable the depth map for all 3D-HEVC coding.

MV- HEVC and 3D -HEVC coding standards is used. The common test conditions is followed and the Random Access Main (RA-Main) setting is tested with QP values equal to 15, 20, 25, and 30.

CONCLUSION

We reveal a new application of using HEVC coding standard and its extension for the compresssion of MIIR videos.After applying channel seperation on raw MIIR vide four encoding methods are proposed using multi model coding structures.Those methods can apply in different situation and requirements .Compress the video in most efficient way,then 3D HEVC is highly recommended.The clear image is get by DWT method it change the intensities values depend on its neighbour pixel to see the image clear. CLAHE limiting the contrast can also be applied to global histogram equalization, giving rise to contrast limited histogram equalization and to prevent the noise in the image.

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