Journal of Theoretical and Applied Information Technology
10th October 2014. Vol. 68 No.1

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

PERFORMANCE & ANALYSIS OF BLOCKING ARTIFACTS REDUCTION USING GUASSIAN ADAPTIVE SPATIAL LOW PASS FILTER

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ABSTRACT

Ringing artifacts that appear as spurious signal near sharp transitions in a signal appear as ghosts (or) near edges. Two techniques called LPF and ASLPF is used. LPF is used for only just identifying the artifacts present in the video image. ASLPF (Adaptive Spatial Low Pass Filter) is used to identify the artifacts whether it is present in horizontal (or) vertical position (or) near edges. DCT is applied to each and every pixel in the block; the spatial domain is converted into frequency domain. But now a technique called Adaptive Spatial Low Pass Filter (ASLPF) is used to identify the artifacts and remove it completely. Video is converted into frames and each frame is compressed for removing the artifacts. Finally the reduction of artifacts is shown in PSNR.

Key words: *Low Pass Filter, Adaptive Spatial Low Pass Filter, Discrete Cosine Transform, Peak Signal to Noise Ratio, Blocking Artifacts and Ringing Arifacts.*

1. INTRODUCTION

Video is basically a three-dimensional array of color pixels. Two dimensions serve as spatial (horizontal and vertical) directions of the moving pictures, and one dimension represents the time domain. Video takes up a lot of space. "Compressed", means that the information is packed into a smaller space. Lossy compression means that the compressed file has less data in it than the original file. In some cases this translates to lower quality files, because information has been "lost". Lossy compression makes up for the loss in quality by producing comparatively small files. Lossless compression is exactly what it sounds like, as compression where none of the information is lost. This is not nearly as useful because files often end up being the same size as they were before compression. This may seem pointless, as reducing the file size is the primary goal of compression. However, if file size is not an issue, using lossless compression will result in a perfect-quality picture.

This first set of standards was developed for audio and video compression. The video format was used to store movies on CDs, known as Video CD, Group of Standards (GOS) for encoding and compressing audio visual information such as movies, video, and music. Broadcast quality can be achieved at 6 Mbps.MPEG performs the actual compression using the Discrete Cosine Transform (DCT).At the same time it describes a whole family of international standards for the compression of audio-visual digital data. A graphics and video compression algorithm standard is based on MPEG-1 and MPEG-2 and Apple QuickTime technology. Wavelet-based MPEG-4 files are smaller than JPEG or QuickTime files, so they are designed to transmit video and images over a narrow bandwidth and can mix video with text, graphics , 2D and 3D animation layers.

H.264/MPEG-4 AVC(Audio Video Converter) is a recently completed video compression standard jointly developed by the ITU-T VCEG (International Telecommunication Union-Video Coding Experts Group) and the ISO/IEC(International Organization For Standardization/International Electro technical Commission)MPEG standards committee. The standard promises much higher compression than that possible with earlier standard. It allows coding for non-interlaced and interlaced video very efficiently, and even at high bit rates

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

provides more acceptable visual quality than earlier standards. Further, the standard supports flexibilities in coding as well as organization of error or losses. As might be expected, the increase in coding efficiency and coding flexibility comes at the expense of an increase in complexity with respect of earlier standards.

2. EXISTING METHODS

Alan Liew, and Hong Yan, (2011) had Proposed that a low bit rate Discrete Cosine Transform (DCT) compressed image exhibits visually annoying blocking and ringing artifacts. In this several discontinuities can occur. Alan, and Liew, W.C. (2011) had proposed that the compressed image exhibits visually annoying blocking and ringing artifacts. In this, a deblocking algorithm is used to reduce the both the ringing artifacts and mosquito noise present in the image. Angleo Bosco and Keith Find later, (2010) had proposed video sequences denoising that exploits extra information provided by image sensor. Temporal random noise technique is used. Anudeep Gandam and Davient Jalandhar, (2009) had proposed video sequences denoising filter that exploits extra-information, provided by image sensor. Temporal Random noise Technique is used. Apostolopoulos, (2009) had proposed Group-of-Pictures (GOP) pattern in MPEG encoding. Quality metrics, digital video compression, stochastic process, New synthetic Test pattern of moving Spirals technique is used. Bahadir et al (2010) had Proposed Algorithm that uses pixel-by-pixel processing to identify and reduce both blocking artifacts and mosquito noise, while attempting to preserve the sharpness and naturalness of the reconstructed video signal and minimize the system complexity. Blocking artifacts technique is used.

Bhaskaran, V. and Konstantinides, K. (2012) had proposed the use of MSDS and $MSDS_t$ are measuring block artifact reduction and PSNR for measuring the fidelity of the processed images. Since it emphasizes the complexity reduction of our methods, the processing times are also provided. Finally, include several test images and processed images to provide a subjective comparison. Choy, S.S.O. and Chan, Y.H. (2010) had proposed a new synthetic test pattern of moving spirals or circles is described which generates mosquito noise under Motion Pictures Expert Group (MPEG) compression. The spirals pattern has several spirals or circles which are superimposed on a uniform background. The test pattern is encoded at low bit rates. Clarie mantel and Webb, R.Y. (2011) had proposed spatial-temporal and compression independent mosquito noise corrector, temporal variation inverse filter. Temporal processing, temporal artifacts, temporal analysis, fact temporal filtering technique is used. High performances can occur. Detlev marpe, and heiko Schwarz, (2011) had proposed a adaptive binary arithmetic coding as a normal part of the new ITU standard in the video compression. By combining an adaptive binary arithmetic coding technique a high degree of adaptation and redundancy reduction can be occur. Fenimore, C. and Libert, J. (2012) had proposed a hybrid Wavelet Fractal Code (WFC) for image compression technique. Fractal Compression Technique is used in Adaptive LPF. Geetha K.S et al (2009) had proposed an efficient algorithm to accelerate software video encoders in a suitable manner. In this DCT can be used to increase the computation for motion estimation. It contains limited operation which is only to accelerate the algorithm for video coding.

George et al (2012) had proposed block-based Discrete Cosine Transform (BDCT) is often used in image and video coding. It may introduce blocking artifacts at low data rates that manifest themselves as an annoying discontinuity between adjacent blocks. The experimental results confirm that TSD-MRF can improve visual quality both objectively and subjectively over SD-MRF methods.Gerassimos Strintzis, (2012) had proposed to present a new image recovery algorithm in addition to blocking, ringing artifacts it is from compressed images and video. The new algorithm is based on the theory of Projections onto Convex Sets (POCS). Gonon, G. and Montressor, S. (2009) had proposed coding artifact reduction of MPEG compressed video sequences. The cost-effective technique is used in this paper. In this it is used to sharpen the visibility of an image and also reduce the artifact present in the MPEG image. Gonon et al (2011) had proposed that it has been proved to be an efficient tool of its frequency adaption skills for the basis search algorithm. In this WPD can be used, which improves the best basis search by reducing the entropy of the base.

Journal of Theoretical and Applied Information Technology
10th October 2014. Vol. 68 No.1

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

3. PROPOSED METHOD

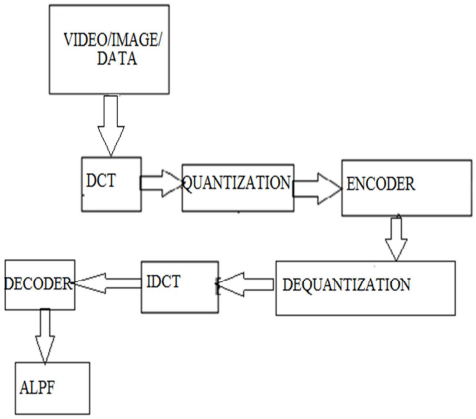

Fig 1: Block Diagram of Adaptive Spatial Low Pass Filter

Discrete Cosine Transform is used to apply on the 8x8 matrix is shown in Fig.1. By applying it is used to identify the artifacts present in the video image is shown in original image Fig 2. DCT is unfortunately computational and is very expensive and its complexity increases disproportionately (O (N^2)). That is the reason why images are compressed by using DCT is divided into blocks it is shown in Fig 3.Another disadvantage of DCT is its inability to decompose a broad signal into high and low frequencies at the same time. Therefore the use of small blocks allows a description of high frequencies with less cosine terms.

*Fig 2: Original Image (486*478)*

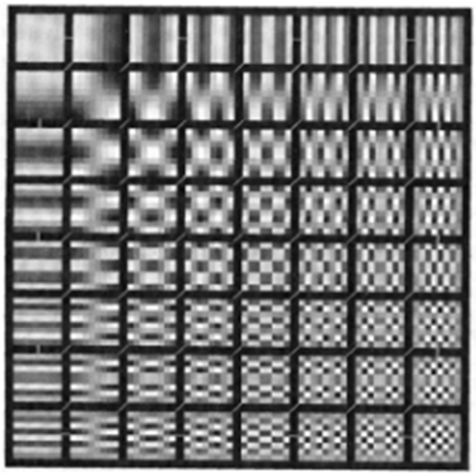

Fig 3: DCT Image

*Fig 4: DCT Applied to the Image (480*470)*

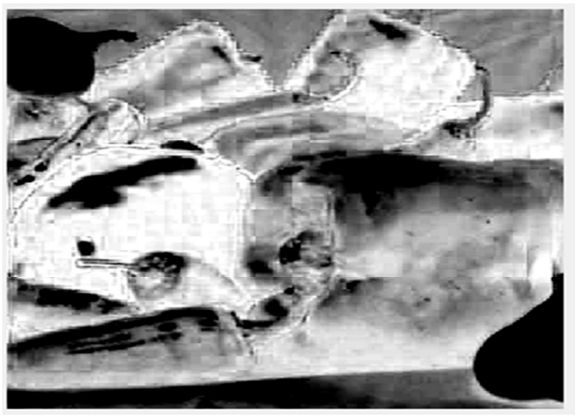

*Fig 5 Encoded Image (475*463)*

Journal of Theoretical and Applied Information Technology
10th October 2014. Vol. 68 No.1

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

When the discrete cosine transform is applied to an image shown in Fig 4 it is separated in to 8*8 blocks (ie) horizontal and vertical blocks. It particularly locates the artifacts present in an image. On applying 8*8 DCT to each block, dot representation indicates the artifact specially the pixel. It transforms the DCT co-efficient of the pixel and partially removes the artifacts. The masking artifacts can be quantized, and it is converted into frequency domain. The video is compressed, during quantization, which is the primary source of data loss, the DCT terms are divided by a quantization matrix, which takes into account of human visual perception. The human eyes are more reactive to low frequencies than to high ones. Higher frequencies end up with a zero entry after quantization and the domain was reduced significantly. It normally describes about digital representation of an video image. It is used to convert the spatial domain in to frequency domain. First DCT is applied in order to locate the artifacts because artifact is an invisible noise and then after encoding the image it partially remove the artifacts. Before applying DCT it is in spatial domain after applying DCT and encoding the image it's converted in to frequency domain it is shown in fig 5...Finally when compared to input image the better image is viewed.

De quantization is the reverse form of quantization. It is used to convert frequency domain into spatial domain. By using inverse transform (IDFT) the artifacts can be removed in the video image. In fact that some of the DCT coefficients of a step function (a sharp edge) have nonzero values. Good results are obtained at very low bit rates, i.e., for images with high blackness effects, otherwise artifacts will appear. This method expands the range of smoothing the blackness effects to include the case when the blackness appearance is not as strong. The recovered images are obtained by using well-known gradient-projection algorithm from the compressed video data. Decoder is used to decode the video image. In this the video image is compressed. It is used to remove the artifacts. In the first block image is decoded and the artifacts are located and the image size is compressed. Before compression technique, image is not better clarity and invisible. But after applying compression technique, the image size would be better clarity is shown in Fig 6.Adaptive Spatial Low Pass Filter is used to reduce the artifacts present in the video image it is shown in Fig 7. It is used to reduce the artifacts. Finally clear video image is showed.

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*Fig 6: Decoder (470*458)*

*Fig.7: Compressed Original Image (468*450)*

4. RESULTS AND DISCUSSION

Algorithm

Step 1: Start the program
Step 2: Input image is given
Step 3: DCT is applied
Step 4: Identification of artifacts
Step 5: Location of artifacts
Step 6: Image is compressed

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ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Step 7: Spatial domain is converted into frequency domain
Step 8: Removal of artifacts
Step 9: Calculate the compression ratio
Step 10: Calculation of PSNR value depending upon the image pixels.

5. OUTPUT EXPLANATION

STEP 1:

*Fig. 8: Original Video Image (320*240)*

Load the input image. Images given as MPEG video image it is shown in Fig 8.Original video image. In 776 video frames, each frame is separated and particularly differentiates the dark channel and bright channel.

STEP2:

*Fig .9: Dark channel (315*235)*

In this step Dark channel is applied. It is applied to identify the artifacts it is shown in Fig 9. The black color in this image represents the presence of artifacts.

STEP3:

*Fig.10: Bright channel (310*230)*

If bright channel is applied to an input image it is shown in Fig 10. It particularly locates the artifact in the video image.

STEP 4:

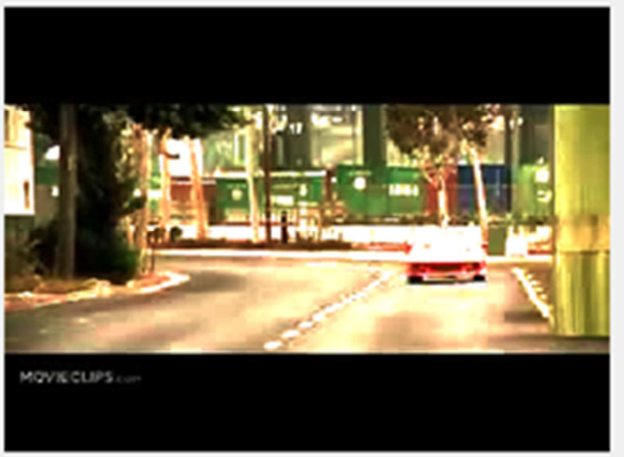

*Fig 11 Combined both channel (307*225)*

Both the dark channel and bright channel view is combined in the picture it is shown in Fig 11.When both channel are combined occurring of artifacts, In the image can be easily removed and it gives a better clarity and clearance when compared to input image.

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ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

STEP 5:

*Fig 12 Enhanced Image (305*220)*

This is the original image with 100% removal of artifacts present in the video image it is shown in Fig 12.

STEP 6:

PSNR FINAL OUTPUT VALUE

```
ans =
   240   320

to =
    0.1000

ans =
   240   320     3

ans =
   240   320     3
PSNR = +60.97 dB
ans =
           1       76800
PSNR = +15.35 dB
ans =
           1       76800
```

According to the image PSNR value may vary. When both channels are combined PSNR value gets decreases, compared to normal image. If the PSNR value decreases as shown above Fig 12

STEP 7:

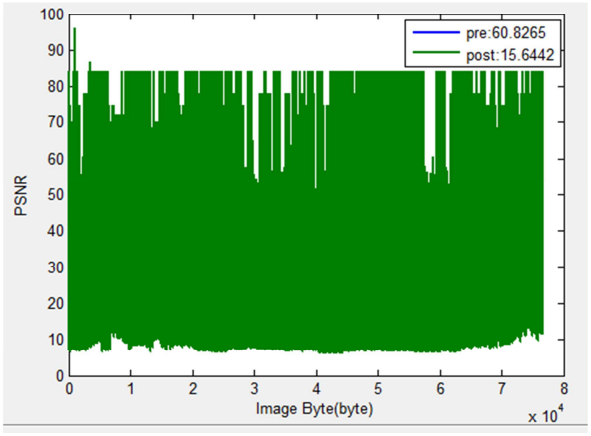

Fig 13 PSNR graph

By applying dark channel and bright channel to this video frame the artifacts are removed. The approximate pre-processing value is 60.8265.Now the value 60.8265 is reduced to 15.6442 due to post-processing method it is shown in Fig 13.Finally the PSNR (Peak Signal to Noise Ratio) value and graph was successfully plotted.

6. CONCLUSION

The blocking artifacts location detection systems operating either in the spatial or in the frequency domain. The two detection systems are capable of detecting locations, which are potentially contaminated by visible mosquito noise or ringing. ASLPF (Adaptive Spatial Low Pass Filter) is used to identify the artifacts whether it is present in horizontal (or) vertical position (or) near edges. Input is given as DCT is applied to the video image; the spatial domain is converted into frequency domain. But now a technique called Adaptive Spatial Low Pass Filter (ASLPF) is used to identify the artifacts and remove it completely Adaptive Spatial Low Pass Filter (ASLPF) technique is used to remove artifacts. Thus PSNR value and PSNR graph can be obtained.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

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