International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 09
May 2016

A Novel Enhancement Techniques of Degraded Video

Daparthi Naresh[1]& B Durga Prasad[2]

[1] PG scholar, Dept. of ECE, AKRG College of Engineering & Technology, Nallajerla, A.P, India

[2]Assistant Professor, Dept. of ECE, AKRG College of Engineering & Technology, Nallajerla, A.P, India

Abstract:

Video enhancement is one of the most important and difficult components in video research. The aim of video enhancement is to improve the visual appearance of the video, or to provide a "better" transform representation for future automated video processing, such as analysis, detection, segmentation, recognition, surveillance, traffic, criminal justice systems. Therefore the overall objective is to improve the results by combining with PCA and non-linear enhancement. The proposed algorithm is designed and implemented in MATLAB using image processing toolbox. The comparison has shown that the proposed algorithm provides a significant improvement over the existing techniques.

Index Terms—spatial-based domain enhancement, noise removal, super-resolution, video enhancement.

I. INTRODUCTION

Video enhancement problem can be formulated as follows: given an input low quality video and the output high quality video for specific applications. How can we make video more clearer or subjectively better? Digital video has become an integral part of everyday life. It is well-known that video enhancement as an active topic in computer vision has received much attention in recent years. The aim is to improve the visual appearance of the video, or to provide a "better"transform representation for future automated video processing, such as analysis, detection, segmentation, and recognition [1-5]. Moreover, it helps analyses background information that is essential to understand object behavior without requiring expensive human visual inspection [6]. There are numerous applications where digital video is acquired, processed and used, such as surveillance, general identity verification, traffic, criminal justice systems, civilian or military video processing et al. Carrying out video enhancement understanding under low quality video is a challenging problem because of the following reasons [2-3, 6-9].

a) Due to low contrast, we cannot clearly extract moving objects from the dark background. Most color-based methods will fail on this matter if the color of the moving objects and that of the background are similar.
b) The signal to noise ratio is usually very low due to high ISO (ISO is the number indicating camera sensors sensitivity to light). Using a high ISO number can produce visible noise in digital photos. Low ISO number means less sensitivity to light.
c) The information carrying video signal is a degraded version of a source or original. Video signal which represents the three dimensional continuous world. These degradations can be a result of the acquisition process, or the rate and format conversion processes.
d) Environmental information affects the way people perceive and understand what has happened. Hence, dealing with moving tree, fog, rain, behavior of people in nighttime video are the difficult because they lack background context due to poor illumination.
e) Inter-frame coherence must also be maintained i.e. the moving objects region as weights in successive images should change smoothly.
f) One pixel from a low quality image may be important even if the local variance is small, such as the area between the headlights and the taillights of a moving car.
g) The poor quality of the used video device and lack of expertise of the operator.

International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 09
May 2016

II. LITERATURE SURVEY

In the literature [13-15], several approaches for super resolution are often found and square measure sometimes classified as frequency- and spatial-based-domain. In some works on frequency-domain super-resolution, the authors additionally extend the super-resolution downside by adding noise and blur into low-resolution pictures [16], [17]. A selected application of the super-resolution downside is in mixed-resolution video, i.e., in video with totally different resolutions on time. The solutions bestowed in previous works [18], [19] avoid AN ill-posed downside by victimization key-frames as example. In those, dictionaries square measure created as samples of high-resolution pictures.

In this paper, we tend to target video improvement considering each areas of self-enhancement and frame-based fusion improvement. Research within the field started as early as within the 70s with the appearance of computers and therefore the development of efficient video processing techniques. We tend to conjointly discuss connected image improvement techniques, since most video improvement techniques area unit supported frame improvement. We tend to don’t aim at covering the complete field of video improvement and its applications. It’s a broad subject that's still evolving. E.g. we tend to don’t discuss contributions, that area unit created by ITU and ISO normal during this space.

There square measure connected works supported video quality improvement [20], spatio-temporal filtering [21], video debluring [22], or video denoising. Studies concerning a flicker [23] additionally yield video improvement supported temporal correlation. To the simplest of our data, we tend to square measure the primary to use AN example based approach for video improvement, that square measure appropriate for cloud-based applications [24].

Many standard image process algorithms area unit supported the belief of native structural regularity, that states that there area unit significant structures within the abstraction area of natural pictures. Examples area unit bilateral filtering [9] and structure tensor primarily based ways [10], [11], [12]. These ways utilize the native structural patterns to regularize the image process procedure and area unit supported the belief that pictures area unit regionally swish except at edges.

III. PROPOSED SYSTEM

A. Intensity Flicker Correction

Intensity flicker is defined as unnatural temporal fluctuations of frame intensities that do not originate from the original scene. Intensity flicker is a spatially localized effect that occurs in regions of substantial size.

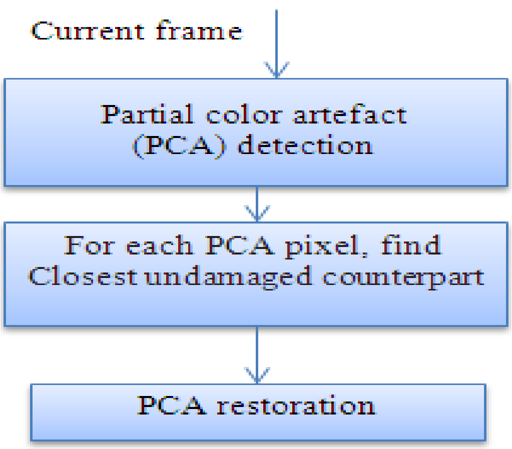

Fig.1 proposed algorithm process

Fig.1 shows the process our proposed algorithm in which it takes video as input and converts in to frames for preprocessing that contains three or four successive frames from a sequence containing flicker. The earliest attempts to remove flicker from image sequences applied intensity histogram equalization or mean equalization on frames. These methods do not form a general solution to the problem of intensity flicker correction because they ignore changes in scene contents, and do not appreciate that intensity flicker is a localized effect. In section we show how the flicker parameters can be estimated on stationary image sequences.

B. Performance analysis

This section contains the cross validation between existing and proposed techniques. Some well-known image performance parameters for digital images have been selected to prove that the performance of the proposed

International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 09
May 2016

algorithm is quite better than the existing methods. Table.1 has shown the quantized analysis of the mean square error. As mean square error need to be reduced therefore the proposed algorithm is showing the better results than the available methods as mean square error is less in every case.

MSE and PSNR

In mathematic statistics, MSE (Mean Square Error) of an estimator is a way to quantify the difference between an estimated value and the true value.

$$MSE(T) = E((T-\theta)^2)$$

MSE is defined as the respect of to the estimated parameter T. To estimate the quality of an image, the estimator can be supposed as a sum of an original signal and a distorted error signal. In this way, the difference of two images can be calculated and quantifies the strength of the error signal.

$$MSE = \frac{1}{MN}\sum_{i=1}^{M}\sum_{j=1}^{N}[a(i,j) - \hat{a}(i,j)]^2$$

In this formula $a(i,j)$, and $\hat{a}(i,j)$ represent the intensity or color value of the reference image and reconstructed image; MN expresses the total number of an image pixels; $a_{max} = 2^1 - 1, 1$ which is defined as color depth usually equals to $8, 0 < a < 255$.

Another traditional method is Peak signal-to-noise ratio (PSNR) which is widely used in analogue systems by calculating a full reference quality metric. PSNR is easily defined via MSE as below.

$$PSNR = 10log_{10}\frac{a_{max}^2}{MSE}$$

a_{max} is 255when images are represented using 8 bits per sample. PSNR is widely used for evaluation and comparison between different video codec.

Average Difference. As Average Difference needs to be minimized; so the main objective is to reduce the Average Difference as much as possible.

Normalized Absolute Error. As Normalized Absolute Error needs to be reduced.

Maximum Difference. As Maximum Difference needs to be minimized; so the main objective is to reduce them Maximum Difference as much as possible.

Structural Content. As SC needs to be close to 1, therefore proposed algorithm is showing better results than the available methods as SC is close to 1 in every case.

IV. RESULTS AND ANALYSIS

We apply the PCA based filtering degraded video sequences algorithm to a low-quality video sequence. The video sequence (320X240) is compressed using MJPEG codec (each frame is a bmp image) at quality 50. Fig.2 show frame 15,20,25,30 of the degraded video input and Fig.3 shows Flicker and salt-pepper noise with Bilateral filter and finally as shown in Fig.4 High quality output, respectively.

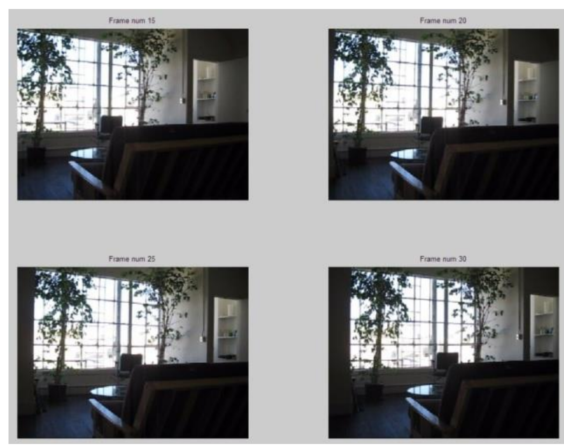

Fig.2 Degraded frames

Fig.3 Flicker and salt-pepper noise with Bilateral filter

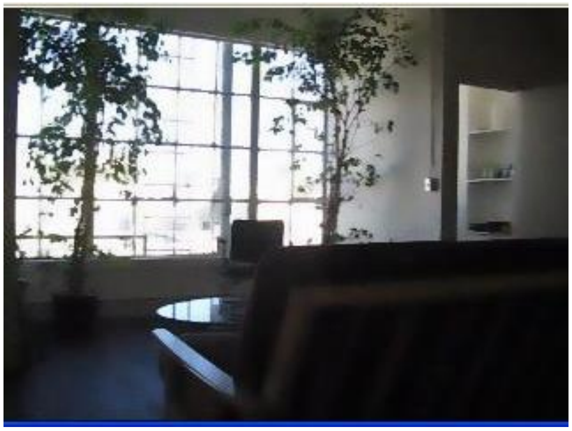

Fig.4 Proposed PCA Enhanced Video sequence

Table.1 performance metrics

Mean Square Error	62.6945
Peak Signal to Noise Ratio	30.1585dB
Normalized Cross-Correlation	0.9975
Average Difference	-0.3941
Structural Content	1.0009
Maximum Difference	49
Normalized Absolute Error	0.0658

V. CONCLUSION

Video enhancement is one of the most important and difficult component of video security surveillance system. The increasing use of night operations requires more details and integrated information from the enhanced image. However, low quality video of most surveillance cameras is not satisfied and difficult to understand because they lack surrounding scene context due to poor illumination. At the end, experiment results were evaluated by MSE and PSNR calculating their performance evaluation.

REFERENCES

[1] S. S. Agaian, S. Blair and K. A. Panetta, Transform coefficient histogram-based image enhancement algorithms using contrast entropy, IEEE Trans. Image Processing, vol. 16, no. 3, pp. 741-758, 2007.

[2] YunBo Rao, W. Lin and L. T. Chen, Image-based fusion for video enhancement of nighttime surveillance, Optical Engineering Letters, vol. 49, no. 2, pp. 120501-1- 120501-3, 2010.

[3] A. Ilie, R. Raskar and J. Yu, Gradient domain context enhancement for fixed cameras, International

Journal of Pattern Recognition and Artificial Intelligence, vol. 19, no. 4, pp. 533-549, 2005.

[4] H. Hu, Video enhancement: content classification and model selection, Ph. D. Thesis, Technique Universities Eindhoven, Eindhoven, Netherlands, 2010.

[5] P.Y Liu, K.B Jia, Research and Optimization of Low-Complexity Motion Estimation Method Based on Visual Perception, Journal of Information Hiding and Multimedia Signal Processing, vol. 2, no. 3, pp. 217-226, 2011.

[6] T. Wan, T. George, T. Panagiotis, C. Nishan and A. Alin, Context enhancement through image fusion: a multi-resolution approach based on convolution of Cauchy distributions, Proc. of the IEEE International Conference on Acoustics, Speech and Signal Processing, pp. 1309-1312, 2008.

[7] Y. Cai, K. Huang, T. Tan and Y. Wang, Context enhancement of nighttime surveillance by image fusion, Proc. of the IEEE 8th International Conference on Pattern Recognition, pp. 980-983, 2006.

[8] J. Li, Z.li Stan, P. Quan and Y. Tao, Illumination and motion-based video enhancement for night surveillance, Proc. of the IEEE 2nd International Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance, pp. 169-175, 2005.

[9] J. Li, Y. Tao, P. Quan and Y. Cheng, Combining scene model and fusion for night video enhancement, Journal of Electronics, vol. 26, no. 1, pp. 88-93, 2009.

[10] X. Li and M. Orchard, "New edge-directed interpolation," IEEE Transactions on Image Processing, vol. 10, no. 6, pp. 813–817, 2007.

[11] Xin Li, "Video processing via implicit and mixture motion models," IEEE Trans. on Circuits and Systems for Video Technology, vol. 17, no. 8, pp. 953–963, Aug. 2007.

[12] Hiroyuki Takeda, Peyman Milanfar, Matan Protter, and Michael Elad, "Super-resolution without explicit subpixel motion estimation," IEEE Transactions on Image Processing, vol. 18, no. 9, 2009.

[13] S. C. Park, M. K. Park, and M. G. Kang, "Super resolution image reconstruction: A technical overview," IEEE Signal Process. Mag., vol. 20, no. 3, pp. 21–36, May 2003..

[14] G. Cristobal, E. Gil, F. Sroubek, J. Flusser, C.Miravet, and F. B. Rodriguez, "Super resolution imaging: A survey of current techniques," in Proc. SPIE, 2008, vol. 7074, pp. 70 740C–1–70 740C–18.

[15] K. Katsaggelos, R.Molina, and J. Mateos, Super Resolution of Images and Video (Synthesis Lectures on Image, Video, and Multimedia Processing). San Rafael, CA, USA: Morgan and Claypool, 2006.

[16] S. P. Kim, N. K. Bose, and H. M. Valenzuela, "Recursive reconstruction of high resolution image from noisy under sampled multiframes," IEEE Trans. Acoustic., Speech, Signal Process., vol. 38, pp. 1013–1027, Jun. 1990.

[17] S. P. Kim and W. Y. Su, "Recursive high-resolution reconstruction of blurred multiframe images," IEEE Trans. Image Process., vol. 2, pp. 534–539, Oct. 1993.

[18] E. M. Hung, R. L. de Queiroz, F. Brandi, K. F. Oliveira, and D. Mukherjee, "Video super-resolution using codebooks derived from key-frames," IEEE Trans. Circuits Systems Video Technol., vol. 22, no. 9, pp. 1321–1331, Sep. 2012.

[19] B. C. Song, S. C. Jeong, and Y. Choi, "Video super resolution algorithm using bi-directional overlapped block motion compensation and on-the-fly dictionary training," IEEE Trans. Circuits Syst. Video Technol., vol. 12, no. 3, pp. 274–285, Mar. 2011.

[20] D. T. Vo and T. Q. Nguyen, "Quality enhancement for motion JPEG using temporal redundancies," IEEE Trans. Circuits Syst. Video Technol., vol. 18, pp. 609–619, May 2008.

[23] D. T. Vo and T. Q. Nguyen, "Optimal motion compensated spatiotemporal filter for quality enhancement of H.264/AVC compressed sequences," in Proc. IEEE Int. Conf. Image Processing, Nov. 2009, pp. 3173–3176.

[21] S. C. Jeong, T. H. Lee, B. C. Song, Y. Lee, and Y. Choi, "Video deblurring algorithm using an adjacent unblurred frame," Vis. Commun. Image Process. Nov. 2011.

[22] S. Kanumuri, O.G. Guleryuz, M. R. Civanlar, A. Fujibayashi, and C. S. Boon, "Temporal flicker reduction and denoising in video using sparse directional transforms," in Proc. SPIE Conf. Applications of Digital Image Processing XXXI, 2008.

[23] J. Y. H. Yue, X. Sun, and F. Wu, "Cloud-based image coding for mobile devices–toward thousands to one compression," IEEE Trans.Multimedia, vol. 15, no. 4, pp. 845–857, Jun. 2013.