ISSN: 2321-7782 (Online)
Volume 2, Issue 1, January 2014
International Journal of Advance Research in Computer Science and Management Studies
Research Paper
Available online at: www.ijarcsms.com

Removal of Scratches in Videos by Adaptive Filtering Technique Using MATLAB

B. Bosu Babu[1]
M.Tech Scholar
Department of ECE
Vignan's Institute of Information Technology
Visakhapatnam-49 - India

Madhusudan Donga[2]
Assistant Professor
Department of ECE
Vignan's Institute of Information Technology
Visakhapatnam-49 - India

Abstract: ***In this paper a fast algorithm for removing line scratches in movies is presented. It is strongly based on exploiting the defect visibility in the image. To aim this, the Weber's law can be applied to coefficients of an over-complete wavelet representation of the degraded image. The intensity of the defect, which is represented as a light diffraction effect, is then attenuated in the vertical and approximation sub-bands till the minimum threshold of visibility is reached. The experimental results are very satisfying: the image is completely recovered without local artifacts or annoying smoothing effects. This paper discuss about frame conversions from a digital video of specific length and then preprocess the Image in order to enhance the Image quality and then performing the process of line scratch removal or artifacts. The final video is once again framed from the processed frames .the overall system is developed in Matlab through the guide model and the results are analyzed.***

Keywords: Scratches, Matlab, Artifacts, Adaptive Median filter, Video.

I. INTRODUCTION

With the rapid spread of digital imaging technology in Scientific and Research fields is enormous. Now a day, the importance of reliable data identification from digital images will only increase. This is especially true for establishing the origin of images presented for image Analysis or for feature extraction also, the identification method could be used to prove that certain imagery has been obtained using a specific camera and is not a computer-generated image.

Scratches are a common problem in archived film. The problem is transferred to video during the telecine transfer process. The artifact is easily visible as a vertical line of bright or dark intensity, oriented more or less vertically over much of the image. It may be caused when material from some particle is smeared vertically over the film material in the projector or by the abrasion of the film as it passes over some particle caught in the mechanism. The task is to propose a technique for the automatic detection and removal of the artifact.

Detection is complicated by the fact that lines occur as natural phenomena in interesting scenes. Furthermore, the defect can occur in the same or nearly the same location in consecutive frames. Thus detection of artifacts cannot rely on temporal discontinuity in image brightness, and the paper concentrates on removing such Scratches. The Input in this paper can be any video sequence with scratches already inbuilt or else considering a video of low quality and adding scratches to the video in order to implement the algorithm. The video is converted into images and then processed (Scratches are removed) and finally the images are framed up to form a complete video. This process has an advantage of removal of scratches from old and useful videos.

In this paper the I is about the introduction, Session II discusses about the video to frame conversion, III is about Edge Detection and Scratch removal techniques, IV is about frame to video conversion V represents the results and outputs followed by conclusion and future Scope in VI.

II. Video to Frame Conversion

Data in images and video sequences provide highly condensed information about the contents of the images or video sequences and can be used for video browsing in a large video database.

Video is stream of frames per second. This video is converted into frames taking samples of the video with respect to time. Here in this paper, we consider an input video and convert it into frame. The number of frames obtained depends upon the length of the video sequence.

III. Edge Detection

Edges are boundaries between different textures. Edge also can be defined as discontinuities in image intensity from one pixel to another. The edges for an image are always the important characteristics that offer an indication for a higher frequency. Detection of edges for an image may help for image segmentation, data compression, and also help for well matching, such as image reconstruction and so on.

There are many methods to make edge detection. The most common method for edge detection is to calculate the differentiation of an image. The first-order derivatives in an image are computed using the gradient, and the second-order derivatives are obtained using the Laplacian. Another method for edge detection uses Hilbert Transform. And we have proposed a new method called short response Hilbert transform (SRHLT) that combines the differentiation method and the Hilbert transform method[1].

Scratch detection algorithms can be divided into two categories: spatial and temporal. As acknowledged in a very recent review [1], both approaches are complementary and benefit from one another's advantages.

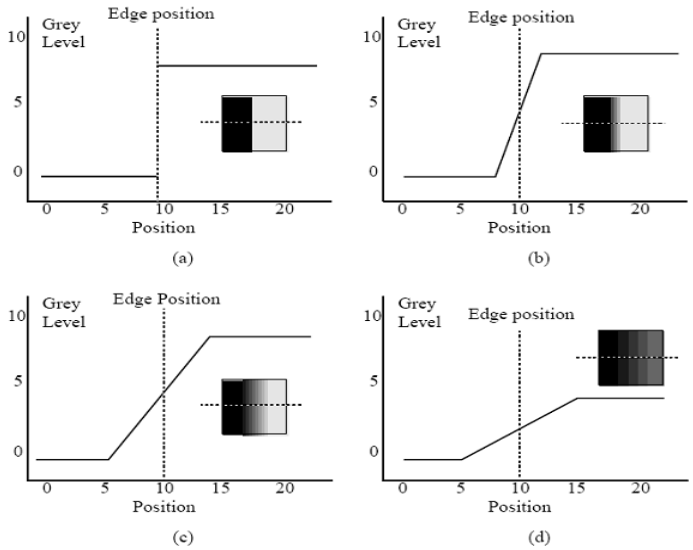


Fig. 1: Step edges. (a) The change in level occurs exactly at pixel 10. (b) The same level change as before, but over 4 pixels centered at pixel 10. This is a *ramp* edge. (c) Same level change but over 10 pixels, centered at 10. (d) A smaller change over 10 pixels. The insert shows the way the image would appear, and the dotted line shows where the image was sliced to give the illustrated cross-section[1].

IV. Principle of Scratch Removal with Variable Window using Hough Transform

A median filter is effective for removing isolated noises. Suppose that and the area of an image with a black vertical scratch is given as shown in Fig. 1(a). Here the image area is enlarged to show the details and each small square corresponds to an image pixel. If a one-dimensional horizontal median filter is applied, the vertical black line can be removed as shown in (b) and

we can say the image is restored completely. Here, the window size of the median filter is supposed to be larger than or equal to 2M+1, where he width of the scratch is M. However, if the image area contains an object as shown in Fig.1(c) and scratch is added as (d), the median filter distorts the object as shown in (e).[1]

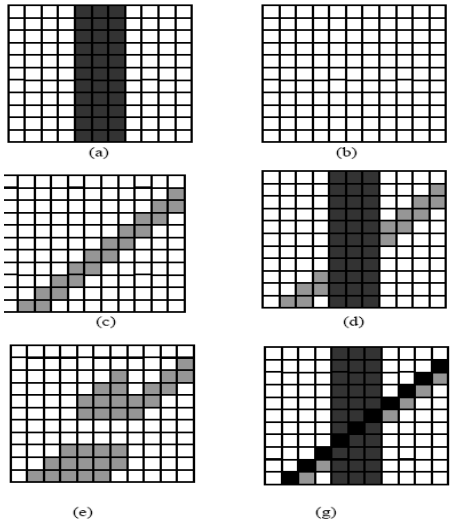


Fig. 2: Examples of the area of an image where scratch is added. [1]

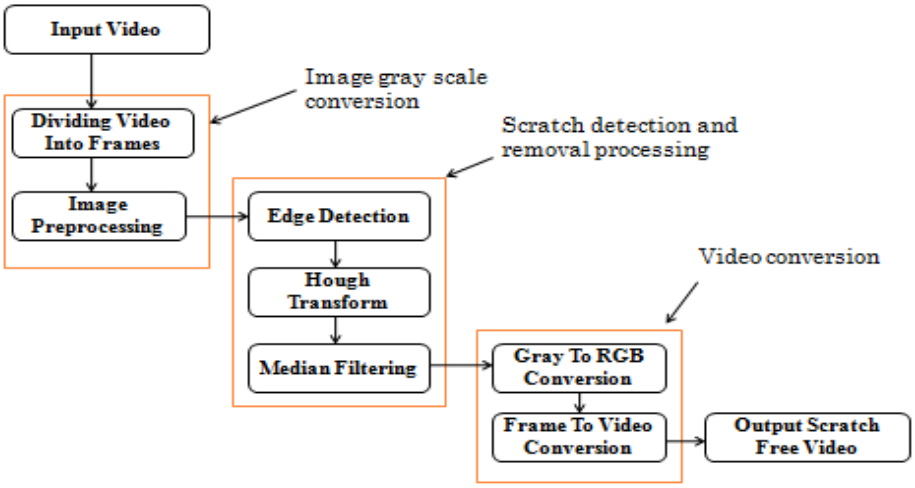


Fig. 3: block diagram for scratch detection and removal process

V. FILTERS

The median filter will simply replaces the pixel value with the *mean* of neighboring pixel values; it replaces it with the *median* of those values. The median is calculated by first sorting all the pixel values from the surrounding neighborhood into numerical order and then replacing the pixel being considered with the middle pixel value. (If the neighborhood under consideration contains an even number of pixels, the average of the two middle pixel values is used.)[1]

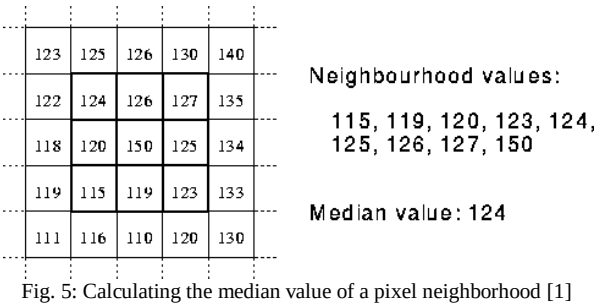


Fig. 5: Calculating the median value of a pixel neighborhood [1]

In this paper we use median filter and Hough transform to remove various scratches from the input images and the results are analyzed

This method first detects scratches, and then interpolates the pixels on scratch with a one-dimensional median filter. The direction of the filter window is obtained by Hough transform, so that the median window contains a straight line element crossing the detected scratch. If a line element is not detected on the scratch, usual one-dimensional median filter with a horizontal window is applied.

VI. GRAY TO RGB CONVERSION

The output of the median filtering will be scratch free frame which will be of gray scale. Gray scale frame has to be converted into RGB for restoring the video sequence. Comparing the median gray scale image with the similar original frame and making the pixels of gray frame to be replaced by the same level of pixel value.

VII. FRAME TO VIDEO

The obtained scratch less images are finally piled up and converted into a sequence of images i.e., converted into a video and this whole program is designed in Matlab and the results are obtained.

Even though there is much amount of complexity involved in this process in terms of time and operational point of view when compared to existing methods of various scratches removal techniques. This method gives us more satisfactory results.

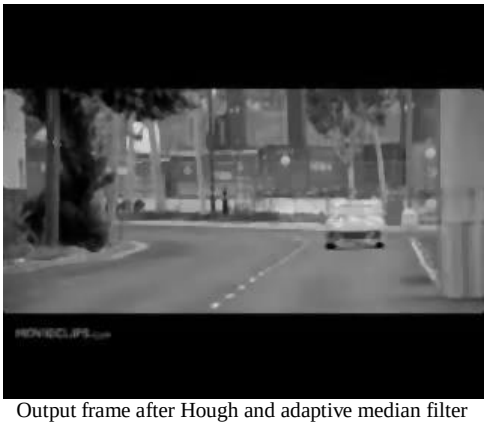
VIII. CONCLUSION

This paper discusses about the technique to remove scratches on films using a median filter with a variant window. Here in this technique, first detects scratches in the frame, and then interpolates the pixels on scratch with a one-dimensional median filter. The direction of the filter window is obtained by Hough transform, so that the median window contains a straight line element crossing the detected scratch. If a line element is not detected on the scratch, usual one-dimensional median filter with a horizontal window is applied. Computer simulations is done using the MATLAB for the proposed method for making the frame effectively removed the scratches without making distortion in the input image.

IX. RESULTS

Original frame

Gray scale frame



Output frame after Hough and adaptive median filter

RGB converted frame after the median filter

X. FEATURE SCOPE

RGB conversion for the filtered frame is completely satisfactory for in restoring the original frame and the time duration for this conversion as made the complex in the results. Scratches in the all frames of the videos all are not removed simultaneously. Scope for making the all the frame to undergo filtering scheme at a time and reducing the RGB conversion time are the aspects to be looked forward regarding this paper.

References

1. Kenta Chishima, Kaoru Arakawa, "A Method of Scratch Removal from Old Movie Film Using Variant Window by Hough Transform". Proc.2009. IEEE-ISSN-978-1-4244-4522-6.
2. Byoung-moon You, Kyung-tack Jun2, Sang-kook Kim, and Doo-sung Hwang "Detection and Restoration of Vertical Non-linear Scratches in Digitized Film Sequences". Proc. IEEE-2007.
3. Alasdair Newson, Patrick Pérez, Andrés Almansa, Yann Gousseau "Adaptive Line Scratch Detection in Degraded Films".
4. T.Seto, T.Komatsu, T.Saito, "Detection and Removal of Film Scratches with Morphology Filtering and HoughTransformation", Proc. 2000 ITE Annual Convention.
5. Saito.T, Komatsu.T, Ohuchi. T, Seto.T, "Image processing for restoration of heavily-corrupted old filmsequences", Pattern Recognition, 2000.Proceedings. 15th International Conference on, vol.3.
6. T.Bretschneider, O.Kao, PJ.Bones, "Removal of Vertical Scratches in Digitised Historical Film Sequences Using Wavelet Decomposition", Proceedings of the Image and Vision Computing New Zealand, 2000.
7. Joyeux. L, Boukir.S, Besserer.B, "Film line scratch removal using Kalman filtering and Bayesian restoration", Fifth IEEE Workshop on Applications of Computer Vision, 2000.
8. Tegolo. D, Isgro. F, "Scratch detection and removal from static images using simplestatistics and genetic algorithms", Image Processing, 2001.Proceedings. 2001 International Conference on, vol.1.
9. J.Canny, "A Computational Approach to Edge Detection", IEEE Transactions on Pattern Analysis and Machine Intelligence,Vol.8, No.6, Nov.1986.

AUTHOR(S) PROFILE

B. Bosu Babu obtained his B.Tech degree from MIC College of Technology, Kanchikacherla affiliated to JNTUK, Krishna District, Andhra Pradesh, India in the year 2006-10. And he is pursuing M. Tech degree from Vignan's institute of Information and Technology, Visakhapatnam, affiliated to JNTU Kakinada, India, in the Department of Electronics & Communications Engineering. His Area of interests is Communication systems, VLSI and Image processing.

Madhusudan Donga Obtained his B.Tech. Degree from BonamVenkataChalamaih Institute of Technology And Science Batlapalem affiliated to JNTUK, East Godavari District, Andhra Pradesh, India in the year 2005-09. M.Tech from Vignan‟s Institute of Information and Technology, Visakhapatnam, affiliated to JNTUK, India. Presently he is working as an Assistant, Professor in the department of Electronics and Communication Engineering, Vignan‟s Institute of Information Technology, Visakhapatnam. He has published one paper in International Journals and conferences. He is interested in the fields of wireless communication, signal processing Image and video processing.