ISSN: 2321-7782 (Online)
Volume 3, Issue 6, June 2015
International Journal of Advance Research in Computer Science and Management Studies
Research Article / Survey Paper / Case Study
Available online at: www.ijarcsms.com

Survey of Automatic Line Scratch Detection and Removal in Digitized Film Sequence

Amit A. Bankar[1]
Department of I.T.
AVCOE Sangamner,
A'nagar, Maharashtra - India

Prof. Bharat S. Borkar[2]
HOD, Department of I.T.,
AVCOE Sangamner,
A'nagar, Maharashtra - India

Abstract: ***Video restoration or old film restoration is challenging but sometimes necessary process. The restoration of old films is a subject of primary interest due to the great quantities of old film material present in film archives. Manual digital restoration is time consuming and need intense labor and not cost effective. To avoid this automatic or semi-automatic tools, designed for the detection and restoration of defects are highly desirable. The nature of work in such old video restoration includes dust/dirt, blotches, flicker and line scratches etc. Last defect is of our interest. It is usually caused by an abrasion to the physical film. These line scratches appear as thin bright or dark lines which are roughly straight and vertical. These defects also present the singular characteristic of temporal persistence, meaning that they remain in the same or a similar spatial position for several frames. Consequently, line scratch detection algorithms must be specially adapted to this defect. Basic motto of this survey is to find good solution and automatic algorithm for frame-by-frame vertical line scratch detection in old as well as new films. Also for false detection there should be way / algorithm that helps to tends towards the accuracy.***

Also to find way to avoid over-detection in textured or cluttered areas. As part of scope of our system the technique revolves around the vertical scratch detection in it.

Keywords: Video restoration, linear scratch.

I. INTRODUCTION

Maintaining the old video quality is challenging job and restoring such old valuable digital asset is cumbersome task. As a scope of this research, old videos having vertical line scratch due to physical damage or abrasion should be detected. The research should provide solution using which vertical line scratch should be detected by avoiding background confusion. Also detected scratch region should automatically patched up and scratch should eliminated by the system. This survey is to find such scratch detection algorithm and to find scratch elimination algorithm. Also survey should investigate the performance efficiency of the solutions based on the results worked out by previous literature or experiments. Along with this main expected outcome from the literature survey is to design automated system using which vertical line scratch should be detected and eliminated without changing rest of the film quality. Also clutter and texture background should not affect the detection and elimination.

II. RELATED WORK

Following are references that we need to consider while landing on some solution. [1] is the base paper proposed named "Robust Automatic Line Scratch Detection in Films". This system proposed solution for vertical line scratch detection in black and white films. This base paper also having references that helps to understand the algorithm approach and flaws in old assumptions. Paper [2] is online reference. It basically explains what scratch on film exactly means. It explains what is tearing, scratching, cinching, machine scratching , base scratching , emulsion scratching , water damage and other blemishes shortly but perfectly. It helps us to decide the area of interest as far as scratches on film is concern. Also in [3] they propose a method for detecting geometric layout in an image, without any a prior information. Roughly speaking, they say that an observed geometric

event is "meaningful" if the expectation of its occurrences would be very small in a random image. They discuss the apories of this definition, solve several of them by introducing "maximal meaningful events" and analyzing their structure. This way is applied to the detection of alignments in images. In this contrario methodology is used having pixel precision line scratch detection algorithm having robustness against noise and texture. This will be helpful in our case. But main drawback is only detection is possible and not removal. While considering the detection some false values may redirect to wrong results. In [4] they present an automatic scratch detection and removal technique for archive film sequences. The proposed system mainly utilize temporal coherency of scratch positions, which are obtained using an automatic scratch detection method proposed in the literature. While restoring stage, both spatial and temporal information are in use. New approach is proposed which refuses false detections rather than validating the correct result. In [5] a solution for detecting scratches in old films and videos is presented. The motto is to enable fast, cost-effective processing. They propose a solution, which minimizes the false detection caused by strong vertical image backgrounds. Therefore, this utilizes the fact that scratches are not correlated to the background image content and behavior.

The detection is done by a structural analysis of the image, taking into account precise motion information and textures to separate scratches from real image content. After coherency analysis of the false detected scratches are rejected. The proposed method allows a fast scratch detection and removal in an automatic environment without human interaction. This system employs less robust motion estimation. In [6] line scratch detection can be performed using only spatial information, on a frame-by-frame basis. Another body of work, which we shall call temporal approaches, includes motion information to improve the detection. This paper acknowledged, both approaches are complementary and benefit from one another's advantages. [7] is the first to introduce a spatial model for the detection of line scratches. This model is based on the hypothesis that "side-lobes" are visible on either side of a line scratch. [8] presents a unified model for the detection and removal of line scratches. It is based on modeling the scratch effect by allowing for the diffraction of light. It gives some reasons that how light diffraction can give rise to scratches. The physical modeling of the defect along with its classification as region of partially missing data allows very good results both in detection and in restoration. [9] presents a scratch detection method that automatically detects all kinds of scratches from each frame in old films. Logic behind the scratch in films that it has lower or higher brightness than neighboring pixels. The proposed method considers these characteristics of a scratch, hence it is having two major modules: a texture classifier and a shape filter with multiple structuring elements. In module 1 the texture classifier divides the input image into scratch regions and non-scratch regions using the texture property of the scratch. In second module, the shape filter confirms the classified scratch region with structuring elements which is designed based on the shape characteristics of scratches. Beyond all this [10] presents a model for the detection and restoration of line scratches from color movies. The quality of the restored images is high, while the algorithms are competent and not at all expensive and completely independent. [11] presents a unified model for the detection and removal of line scratches. It is based on modeling the scratch effect by allowing for the diffraction of light. The paper gives some idea that how light diffraction is responsible to scratches.

A suitable detection/reconstruction approach is proposed for removing line scratches from degraded motion picture films in [12]. The detection procedure consists of phases. Very first phase is a simple 1D-extrema detector provides line scratch candidates. Using Kalman filter to rejection of false detections is carried out. A new Bayesian restoration technique, deals the dark and bright intensities and scratch is perfectly detected. [13] paper presents , a robust, automatic and pixel-precision spatial line scratch detection algorithm is proposed. In this, detection of a wider range of scratch types is possible. [14] This paper helps for analyzing the motion picture with multiple resolutions. [15] LSD is a linear-time Line Segment Detector giving sub-pixel accurate results. Without parameter setting any image can be worked out. It controls its own number of false detections: on average, one false detection is allowed per image.

III. Analysis

All of the above systems works on effective line scratch detection techniques. These spatial detection algorithms have several weaknesses. The very first thing is that scratch is represented as a straight, vertical line. In practice, this hypothesis is often violated, and as a consequence many true scratches may be missed. Some experiments explores that old algorithms badly reacted in noisy or textured regions. Proposed system should deal with this important problem explicitly, by taking into account a locally adaptive detection model, and setting the thresholds accordingly. At the end line scratch detection algorithms often represent the scratches as covering the entire height of a frame. This sort of detection runs the risk of restoring parts of the image which are not degraded. The existing scratch detection papers only focus on scratch detection but not the removal.

IV. Construction of Proposed System

There must be a system that help user to identify the scratch in the black and white as well as color videos. User should have facility to remove scratches from the video. These scratches must be vertical one. Hence proposed system should detect as well as remove vertical scratch from videos.

V. Conclusion

This research concludes that there is need of modules so that efficient vertical line scratch detection from color as well as black and white videos should be removed.

References

1. Alasdair Newson, Andrés Almansa, Yann Gousseau, and Patrick Pérez , “Robust Automatic Line Scratch Detection in Films” IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 23, NO. 3, MARCH 2014
2. (2013, Sep. 27). Physical Damage, National Film and Sound Archive [Online]. Available.http://www.nfsa.gov.au/preservation/handbook/damage-films/physicaldamage/
3. A. Desolneux, L. Moisan, and J. M. Morel, “Meaningful alignments,” Int. J. Comput. Vis., vol. 40, no. 1, pp. 7–23, Oct. 2000.
4. M. K. Gullu, O. Urhan, and S. Erturk, “Scratch detection via temporal coherency analysis and removal using edge priority based interpolation,” in Proc. IEEE Int. Symp. Circuits Syst., May 2006, pp. 4591–4594.
5. S. Müller, J. Bühler, S. Weitbruch, C. Thebault, I. Doser, and O. Neisse, “Scratch detection supported by coherency analysis of motion vector fields,” in Proc. 16th IEEE Int. Conf. Image Process., Nov. 2009, pp. 89–92.
6. A. Kokaram, F. Pitie, D. Corrigan, D. Vitulano, V. Bruni, and A. Crawford, Advances in Automated Restoration of Archived Material. Boca Raton, FL, USA: CRC Press, 2011.
7. A. Kokaram, “Detection and removal of line scratches in degraded motion picture sequences,” Signal Process., vol. 1, no. 9, pp. 5–8, Sep. 1996.
8. V. Bruni, D. Vitulano, and A. Kokaram, “Line scratches detection and restoration via light diffraction,” in Proc. 3rd Int. Symp. Image Signal Process. Anal., vol. 1. 2003, pp. 5–10.
9. K.-T. Kim and E. Y. Kim, “Film line scratch detection using neural network and morphological filter,” in Proc. IEEE Conf. Cybern. Intell. Syst., Sep. 2008, pp. 1007–1011.
10. V. Bruni, P. Ferrara, and D. Vitulano, “Color scratches removal using human perception,” in Proc. 5th Int. Conf. Image Anal. Recognit., Jun. 2008, pp. 33–42.
11. V. Bruni, D. Vitulano, and A. Kokaram, “Line scratches detection and restoration via light diffraction,” in Proc. 3rd Int. Symp. Image Signal Process. Anal., vol. 1. 2003, pp. 5–10.
12. L. Joyeux, S. Boukir, and B. Besserer, “Film line scratch removal using Kalman filtering and Bayesian restoration,” in Proc. 15th IEEE Workshop Appl. Comput. Vis., Dec. 2000, pp. 8–13.
13. A. Newson, P. Pérez, A. Almansa, and Y. Gousseau, “Adaptive line scratch detection in degraded films,” in Proc. 9th Eur. CVMP, 2012. pp. 66–74.
14. J. M. Odobez and P. Bouthemy, “Robust multi-resolution estimation of parametric motion models,” J. Vis. Commun. Image Representation, vol. 6, no. 4, pp. 348–365, 1995.

AUTHOR(S) PROFILE

Amit Bankar received the B.E. in Computer Engineering from Amrutvani College of Engineering, Sangamner, A'nagar, MS. He has five years of teaching in YCMU, Nasik. Currently studying M.E. in Information Technolgy from AVCOE, Sangamner.

Prof. Bharat Borkar received the B.E. and M.E. in Computer Engineering from AVCOE, Sangamner and MGM College of Engineering, Nanded, MS, respectively. He has more than 11 years of teaching experience and currently working as Head of the Department (Information Technology) at AVCOE, Sangamner.