A System for Digitizing Silver Halide Films

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Abstract. Photographic market has turned digital. Technologically, photographs have gone through a transitional period. Yet, the legacy analog silver halide films still exist. Now it is a transitional period for information. Thus, the legacy silver halide films need be digitized. Also, such analog content need be fed into digital market. The present study proposes a method of taking a shot of a silver halide film with a digital camera beyond the established method of using a scanner to digitize the silver halide films. The proposed method shortens the processing time and improves the resolution in comparison to the existing scanning process.

Keywords: Digital, Silver halide film, Analog film, Digital contents, system, Narrowband wavelength

1 Introduction

Photographs have been digitized and technologically reached a plateau. Yet, a plethora of analog silver halide film data is yet to be digitized, in which sense content production is in a transition state. In particular, photographs among other analog contents are records of history, and most of them cannot be reproduced. 35-mm films account for the highest percentage of the analog silver halide films. The existing digital image processing using flatbed scanners is time-consuming and lacks in resolution even in monochrome photographs. Scanning is sub-divided into flatbed and laser methods. As a rule, the laser method supports high-resolution scanning. Yet, laser scanners are not applicable to monochrome films due to their large particles. Hence, the present study proposes a system for digitizing 35-mm monochrome films using a digital camera. The present findings will be conducive to facilitating the digitization of silver halide film data.

2 Local and global conditions
2.1 Local and global research

No research has investigated a system using digital cameras. Most research deals with scanners. The following are representative studies in this field.

<table>
<thead>
<tr>
<th>Institute</th>
<th>Title</th>
<th>Content and application</th>
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<tbody>
<tr>
<td>Tele-chips, Inc.</td>
<td>Color Correction Using Polynomial Regression in Film Scanner</td>
<td>Film scanner is one of the systems, which can acquire high quality and high resolution images. However, due to the nonlinear characteristic of the light source and sensor, colors of the original film image do not correspond to the colors of the scanned image. Therefore, color correction for the scanned digital image is essential in the film scanner. In this paper, polynomial regression method is applied for the color correction to CIE L^*a^<em>b^</em> color model data converted from RGB color model data[2].</td>
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<tr>
<td>Korean Society of Archives &amp;</td>
<td>A Locally Developed Digital Scanner for Archival Management</td>
<td>Transforming documents and records into archival contents using a locally developed scanner[3]</td>
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<td>Records Management</td>
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<td>Society of Motion Picture &amp;</td>
<td>Digital Film Scanning and Recording: The Technology and Practice</td>
<td>The subject of system calibration is explored. Issues that affect the exchange of images between facilities are described, including file format and image data storage. Some of the operational issues of digital film scanning and recording are also discussed[4].</td>
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<td>Television Engineers</td>
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<td>Hewlett-Packard Development</td>
<td>Color and tone correction of a negative film scan using existing silver-halide print</td>
<td>“This invention relates generally to color correction techniques used in digital color printing and more particularly to improve the color print quality of color printers when reproducing images that have been scanned by a digital scanner. The present invention provides a method and means for creating a high-resolution reproduction of an image that more closely matches the color and tone of an existing photograph made with a traditional photo-finishing process.”[5]</td>
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<td>Company</td>
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2.2 Local and global market

- Korean National Archives constantly digitizes national photographic records.
- Kodak (Kodak Alaris) has its archival management specialists convert customers’ old photographs into digital images, expanding a new market.
- KENKO TOKINA produces a small film scanner targeted at retail consumers.
- Smartphone-based lomo film scanners are drawing public attention.
- On photographic SNS, e.g. Instagram and Tumblr, analog film photos are popular.
- Local and global film industry scans, remasters and releases classic films.

3 System Configuration

This study concerns digitizing 35-mm monochrome silver halide films. On photographing in visible light, diffraction and chromatic aberration determines the resolution. Infrared is also similar electromagnetic wave with visible light and diffraction and chromatic aberration determines the resolution [6]. However, B&W film may not consider the color; the present study intends to enhance the resolution by eliminating the chromatic aberration (using the wavelength region).

In this study, a high-resolution digital camera is used for scanning. As 24-mm X 36-mm digital data is equivalent to approximately 22 megapixels, the process requires a digital camera featuring over 22 megapixels. Currently available digital cameras for professionals support more than 22 megapixels.

4 Conclusion

The present study successfully digitized 35-mm monochrome films with the resolution superior to that of the films shot in visible light. Using a digital camera in lieu of a scanner leads to high resolution and fast processing. Also, the unit production cost is lower than a high-quality scanner. Lots of media contents prior to the digital era were recorded on analog films. Content production environment is expanded by combining digital content production with the 19th-century analog films. The proposed method can facilitate reusing analog contents dying out, and revitalize the dull analog image market. The proposed method will lay the foundation for accelerating the digitization of silver halide films.
References