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A REVIEW ON: A NOVEL TECHNIQUE TO SUPPRESS CORRUPTIVEARTIFACTS FOR EXAMPLE-BASED COLOR TRANSFER FRAMEWORK

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Abstract: Example-based color transfer framework can achieve the color fidelity, prevent the grain effect and preserve the detail seamlessly. Example-based color transfer is a critical operation in image editing but easily suffers from some corruptive artifacts in the mapping process. In this paper, we propose a novel colortransfer framework with corruptive artifacts suppression. Corruptive artifacts would be detected and suppressed by using novel technique. Suppression of the corruptive artifacts would be carried out by using modified example based color transfer algorithm. Color fidelity, grain suppression, detail preservation would be improved by reducing time delay.

Keywords: Color Transfer, Corruptive Artifacts, Color Mapping, Color Fidelity, Detail Preservation, Grain Suppression, Optimization.

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INTRODUCTION

Color manipulation is one of the most common tasks in image editing. While artists resort to photo editing tools to manually adjust color appearance, automatic color appearance adjustment is still of high demand, owing to the inherent difficulties to handle complex structures ubiquitous in natural images. In the example-based color transfer, the color appearance from a given “example” is copied to a target grayscale or color image.This is the most effective way to tackle the problem. Taking Figure 1 as an example, due to the big difference in the intensity distribution between the reference and the target, an unsatisfactory results are produced with following artifacts:

Color distortion: Some disharmonious or unexpected colors appear which are not included in the reference image.

Grain effect: A phenomenon appears due to enhancing the noise level of the picture under the stretched mapping. Commonly, it looks like some noises or irregular blocks.

Loss of details: The fine-level details in the target image are missed after the color transfer.

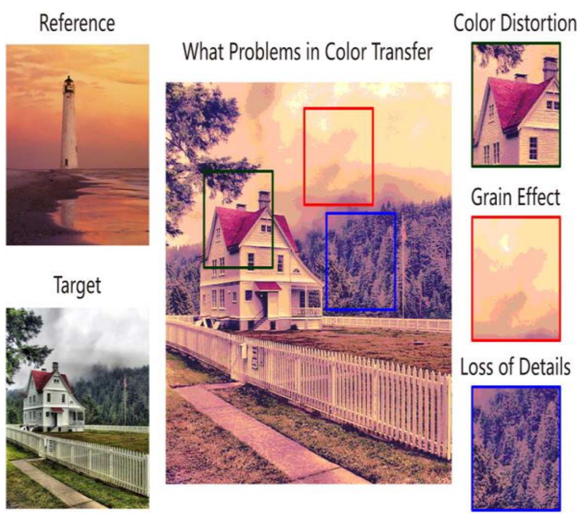

Fig.1: Grain effect, color distortion and loss of details in the Color transfer method

Ideally, color transfer between reference and target images should satisfy the following goals:

Color fidelity: The color distribution of the target should be close to that of the reference image.

Grain suppression: No visual artifacts (grain artifacts) should be generated in the target image.

Detail preservation: Details in the original target should be preserved after the transfer.

A novel technique for example-based color transfer, which aims to achieve simultaneously grain suppression, color fidelity and detail preservation.

II. LITERATURE SURVEY

A novel color transfer framework is used to achieve a unified corruptive artifacts suppression, which is specified in grain suppression, color fidelity and detail manipulation. How to transfer the colors of the given reference to the target effectively is a challenging problem and is significant in color transfer.

Rapid development has been witnessed in the last decade in the field of color transfer. Representative approaches include classical histogram matching, statistical transfer, -dimensional probability density function transfer, gradient-preserving transfer non-rigid dense correspondence transfer , progressive transfer, to list a few. Although these approaches are effective in transferring the color information, they would occasionally produce visual artifacts, owing primarily to the contradictive roles of color distribution preservation and image content distribution. In 2001 Erik Reinhard et al[1] provided method for a more general form of color correction that borrows one image's color characteristics from another. In 2002 Tomihisa Welsh et al.[2] has been introduced a general technique for "colorizing" grayscale images by transferring color between a source, color image and a destination, grayscale image . In 2004 G. Petschnigg et al.[3] introduced a Joint bilateral filter (JBF) which is the first guided edge-preserving smoothing approach. The JBF exploits the pixel intensity of the reference which is correlated to the target to improve the filtering effect. However, like the bilateral filter (BLF), JBF cannot avoid the halo artifact and gradient reversal problem. The grain effect can be treated as a special type of noises and it would be removed by linear smoothing. Although the linear smoothing can remove the grains, the over-blurring would destroy the original image details and lower the sharpness of edges.In 2007 F. Piti´e, A. C. Kokaram, R. Dahyot[4] proposed an original method for grading the colors between different images or shots.

In 2007 Chang *et al*.[5] proposed a color category-based approach that categorized each pixel as one of the basic categories to prevent from the grain effect. Then a convex hull was generated in Lαβ color space for each category of the pixel set, and the color transformation was applied with each pair of convex hull of the same category. In 2007 for the color distortion Tai *et al*.[6]proposed a modified EM algorithm to segment probabilisticallythe input images and construct Gaussian Mixture Models (GMMs) for them, and the relationship was constructed by each Gaussian component pairs between the target and the reference under Reinhard's approach.

In 2010 Dong et al[7]proposed a dominant color idea for color transfer. When the amount of dominant colors of the target was consistent with that of the reference, the color of the reference would be transferred to obtain a satisfactory result. However, when the amount of dominant colors was not balanced, the unsatisfactory result would be produced. Dong's proposed an improved approach distribution-aware conception to consider the spatial color distribution in the reference image. In 2010 Farbman et al[8] introduced the diffusion maps as a distance measurement to replace the Euclidean distance in their weighted least square filter.

In 2011[9] Wang *et al.* developed the learning based color transfer methods to train out the proper color mapping relationship. Also tone and color adjustment rules as mappings has been defined, and proposed to approximate complicated spatially varying nonlinear mappings in a piecewise manner. In 2011 Pouli and Reinhard[10] proposed a progressive histogram reshaping technique for images of arbitrary dynamic range, which still suffers from color distortion in some extreme cases. Recently, in 2011Paris *et al*[11]. Explored the local Laplacian pyramid to yield the edge-preserving decomposition for fine-level detail manipulation.

In 2014 Zhuo Su, et al[12]. Proposed a novel unified color transfer framework with corruptive artifacts suppression, which performs iterative probabilistic color mapping with self-learning filtering scheme and multi scale detail manipulation scheme in minimizing the normalized Kullback-Leibler distance.

I. BACKGROUND STUDY

Although we can evaluate the results by visual observing directly, the geometric distribution of the colors in the image would not always be presented as the region assemble but possible dispersion. At this time, it is hard to evaluate the quality of the transferred results by visual observing merely. In our opinion, converting the image to 1-D color histogram and 2-D color scatter diagram. The Reinhard's approach is likely to produce the color distortion, so its K-L values are high in some cases. The Pitié's -dimensional PDF and Xiao's Gradient-Preservation have acceptable K-L values. For Zhuo Su, et al results, the recorded performances are better than those of previous approaches.In this result multi-reference color transfer has been used.Visual comparision for various techniques are shown in figure2.By the experimental analyses in the objective and subjective data, we found that multi-reference framework had a better performance than the state-of-the-art approaches, especially in dealing with the grain effect, color distortion, and loss of details. In addition to the one-to-one transfer, our framework was extended to the multiple-reference color transfer, HDR color transfer and style transfer to demonstrate its flexibility.

Fig2.The visual comparisons.(a) Reference.(b) Target.(c) Histogram matching(d) Reinhard's results(e) Pitié's results(f)Gradient-preserving results(all in)(g) Multi reference color transfer result.

IV PROPOSED METHODOLOGY

Proposed methodology can be divided into following parts:

Detection of corruptive artifacts:

In this module, we develop an algorithm to check presence of corruptive artifacts, and display the location where the artifacts are corrupted.

Modification of Example-based color transfer algorithm:

This module would consist of proper color transfer algorithm to suppress corruptive artifacts from the points where they are detected. And we have to achieve grain suppression, color fidelity and detail manipulation by providing novel technique.

Result Evaluation and Optimization:

In this module, result would be evaluated and optimized if required. Result would be in the form of delay, and accuracy of detection.

The overview of framework is as follows.

Color mapping stage

A color mapping Technique would be applied to achieve the basic color .

Detail manipulation stage

A new manipulation scheme would be applied to preserve or enhance the details.

Integrated optimization stage The transferred result and the modified details are combined into an optimization solution with the measurement to yield the final output as shown in figure.

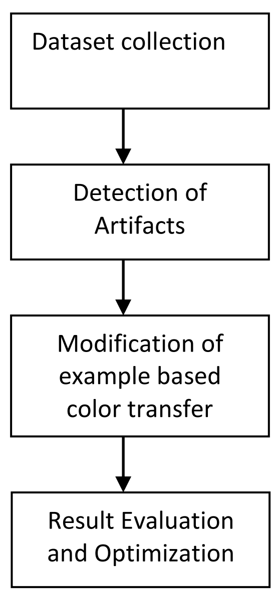

Fig.3 The flow Proposed methodology

A novel color transfer framework has to deal with the corruptive artifacts by reducing Color distortion as well as grain effect and achieving detail preservation. A novel technique would improve result by improving time performance. The framework is sketched in the Fig3.

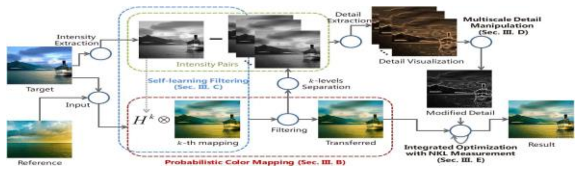

Fig.4 The Pipeline Framework

First, a probabilistic mapping is iteratively applied to generate coarse color mapping. Reducing the -dimensional probability distribution of both reference and target to a one-dimensional probability distribution pair, it can match the color distribution of the target to the reference. Second, the self-learning filtering is embedded into the procedure of color mapping. By converting the original target into an uncorrelated space, the intensity channel is taken as the learning example into the filtering, which is further applied to the mapped result. The K-levels details can be extracted by the differential operator between the original target and the set of transferred outputs. Finally, the details are recombined to the transferred output to produce the result in a multilayer controllable manner.

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