International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 17
November 2016

Color Tweak in Image Mosaicking Application

[1] S.RIZWANA, [2] S.RAGHAVENDRA SWAMI, [3] S.RAVI KUMAR

[1] M.Tech Dept of ECE, PVKK Institute of Technology, Affiliated to JNTUA, AP, India .

[2] Associate Professor, Dept of ECE , PVKK Institute of Technology, Affiliated to JNTUA, AP, India

[3] Associate Professor, Dept of ECE , PVKK Institute of Technology, Affiliated to JNTUA, AP, India

Abstract: — Image Mosaicking have found a vast field of applications ranging from satellite or aerial imagery to medical imaging street view maps, city 3D modelling, texture synthesis or stereo reconstruction and so on. This paper proposes a probabilistic color correction algorithm for correcting the photometrical disparities. First, the image to be color corrected is segmented into several regions using mean shift. Then, connected regions are extracted using a region fusion algorithm. Local joint image histograms of each region are modeled as collections of truncated Gaussians using a maximum likelihood estimation procedure. Then, local color palette mapping functions are computed using these sets of Gaussians. The color correction is performed by applying those functions to all the regions of the image. A new color correction algorithm with the usage of truncated Gaussians is used to perform accurate color distribution. Results show that the proposed approach obtains the best average scores in both data sets and evaluation metrics and is also the most robust to failures.

Index Terms— *Color correction, image Mosaicking, color transfer, color palette mapping function*.

1. INTRODUCTION

Photo Mosaic is a concept in which picture usually a photograph that has been divided into usually equal sized rectangular sections, each of rectangular section is replaced with another photograph that matches the target photo. Image Mosaicking and other similar variations such as image compositing . And stitching had found a huge field of application ranging from aerial Imagery or satellite to medical imaging, street view Maps, city 3D modelling, texture synthesis or stereo reconstruction, to name a few. In general, whenever merging two or more images of the same scene was required for evaluation or integration purposes, a mosaic is built. Two problems are concerned in the computation of an image mosaic the geometric along with the photometric correspondence. Image Mosaicking application is required both photometrical and geometrical registrations between the images that compose the mosaic. First, the image to be color corrected was segmented into several regions using mean shift. Then, connected regions is extracted by using the median filtering technique and local joint image histograms of each region was modelled as collections of truncated Gaussians using a maximum likelihood estimation procedure. The geometric correspondence is usually referred to as image registration and this is the procedure of overlaying two or more images of the same scene taken at different times, maybe from different viewpoints and by different sensors. It should renowned so that the most cases the alignment that was produced by a registration method was never accurate to the pixel level. Hence, a pixel to pixel direct mapping of color is not a feasible solution. On the other hand, the photometrical correspondence between images deals with photometrical alignment of the images capturing devices. The same object under the same lighting condition should be represented to the same color in two different images. Whatever, even in set of images taken from the same camera and the colours representing an object may difference from picture to picture. This poses a problem to the fusion of information from several images. So the problem of how to balance the colour of one picture so that it is matches the color of another must be tackled. This procedure of calibration and photometrical alignment is referred to as color correction between images. is depicted in the paper and compare each to the baseline approach from. This paper proposes a new color correction algorithm presented several technical novelties while compared to the state of the art, Images are color segmented using median filtering technique. The filtering operation is used to take away the disparities in image. Inverse color gradient algorithm is used to determine the layer that needs Mosaicking. Convolution and image Mosaicking is performed to all the region of the image.

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Then the image can be well scrutinized as a high resolution image. A methodology to perform the expansion of the color palette mapping functions to the non overlapping regions of the images. To the best of our information, this paper also presents one of the most complete evaluations of color corrections algorithms for image Mosaicking published in the literature. An extensive comparison, which is include the nine other approaches, two dataset and two distinct evaluation metrics with over sixty image pairs, is presented. The proposed color correction algorithm achieves very high-quality results when compared to state of the art algorithms.

2. EXISTING SYSTEM

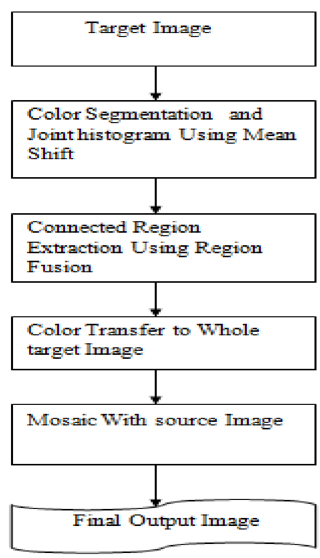
The overlapping portion of the target image undergoes a mean-shift based color segmentation process. Then, color segmented regions are extracted using a region fusion algorithm. Each of the color segmented regions is then mapped to a local joint image histogram. Then, a set of Gaussian functions is fitted to the local joint image histogram using a Maximum Likelihood Estimation (MLE) process and truncated Gaussian functions as models. These Gaussians are then used to compute local color palette mapping functions. The next step is to expand the application of these functions from the overlapping area of target image to the entire target image. Finally, the entire color corrected image is produced by applying the color palette mapping functions to the target image.

3. PROPOSED APPROACH

The current paper proposes a probabilistic approach for modelling local color palette mapping functions. Proposed one of the first parametric methods for color correction. Single Gaussians are used to model the color distributions of the target and source images. The color distribution of the S image is then transferred to the T image by scaling and offsetting according to the mean and standard deviations of the precomputed Gaussians. With this in mind, some subsequent works have proposed to use more complex models, in an attempt to achieve more accurate models of the color distributions, and as a result, more effective color corrections. The usage of Gaussian Mixture Models (GMMs) was proposed in . The GMM was fitted to the data using a Expectation Maximization (EM) methodology. The GMM could not only model the color distribution more accurately, but also assist in the probabilistic segmentation of the image into regions. For each segmented region, a color transfer methodology similar to the one proposed in was proposed. One other problem that may hamper the performance of color correction methodologies is that each color channel in the image is modelled and corrected independently.

Local joint image histograms of each region are modeled as collections of truncated Gaussians using a maximum likelihood estimation procedure. Then, local color palette mapping functions are computed using these sets of Gaussians. The color correction is performed by applying those functions to all the regions of the image. An extensive comparison with ten other state of the art color correction algorithms is presented, using two different image pair data sets.

SYSTEM DESIGN



4. IMPLEMENTATION

A. Mean-Shift Color Segmentation

The first step of the algorithm here presented is to perform a color segmentation of the overlapping portion of the target image Tp into several regions. In this case, only the portion of the target image that contains joint information with the source image is accounted for. Hence, image Tp is split into several regions, which will be treated independently by the color correction algorithm. This methodology is usually referred to as local color correction.

The relevance of mean-shift to perform color segmentation as a preprocessing step for color correction has been established. Compared to other algorithms such as, where an expectation maximization (EM) probabilistic based color segmentation is proposed, mean-shift is better in two major aspects: first, the EM segmentation stage is computationally demanding: authors state that this step takes four minutes to converge while segmenting a 512 ×512 image. Since the local EM based color correction must segment both the source and the target image, the segmentation can take about eight minutes ; second, the expectation maximization stage requires a parameter to define the desired number of regions: this is not useful if unsupervised color correction is required. Mean-shift addresses both drawbacks allowing unsupervised applications and lower computation times.

B. Region Fusion Algorithm

The input to our system is a set of connected regions, rather than a disconnected list of pixels in the same color cluster. This was done using a region fusion algorithm that guides image segmentation with edge information. Region fusion having pixel based region fusion and patch based region fusion .In our system patch based region fusion algorithm is used. This algorithm perform the extract of connected regions.

C. Color Transfer

Color mapping is a function that maps (transforms) the colors of one (source) image to the colors of another (target) image. A color mapping may be referred to as the algorithm that results in the mapping function or the algorithm that transforms the image colors. Color mapping is also called color transfer or, when grayscale images are involved, brightness transfer function (BTF).Color transfer compute the mapping functions. The color correction is performed by applying those functions to all the regions of the image.

D. Image Mosaicking

Image Mosaicking and other similar variations such as image compositing and stitching have found a vast field of applications ranging from satellite or aerial imagery to medical imaging street view maps city super-resolution texture synthesis or stereo reconstruction to name a few. In general, whenever merging two or more images of the same scene is required for comparison or integration purposes, a mosaic is built.

RESULTS

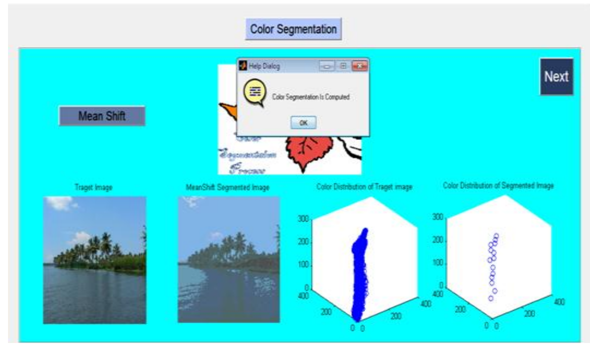


Fig 2: colour segmentation

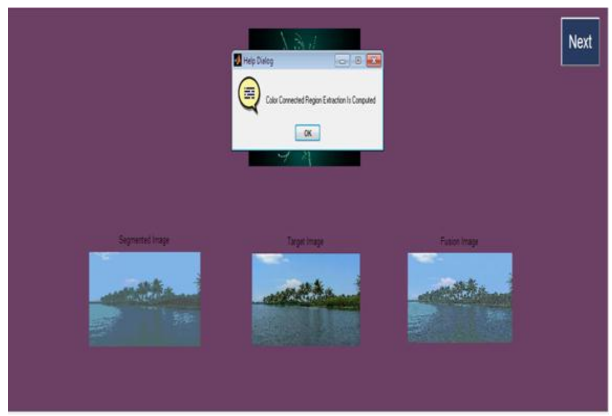


Fig 3: colour correction Region extracted

Fig 4: colour Transfer

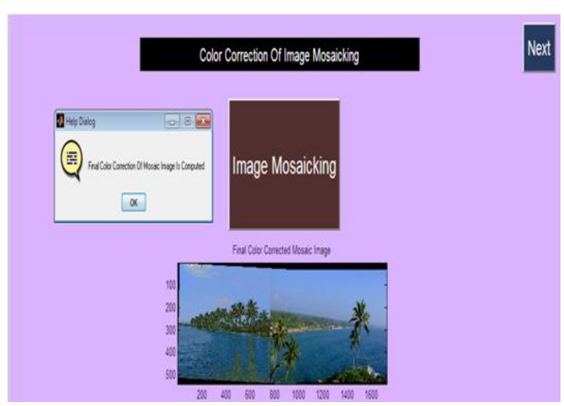


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Fig 5: colour correction of Image Mosaicking

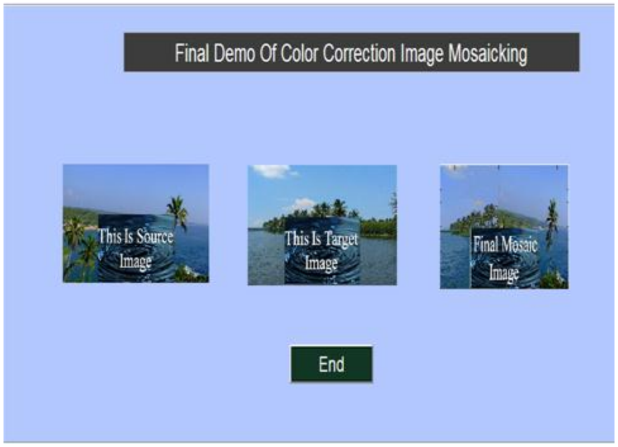

Fig 6: complete colour correction of Image Mosaicking

CONCLUSION

For the proper assessment of the performance of the proposed algorithm, ten other color correction algorithms were evaluated, next to with three alternatives to the proposed approach. Each of the algorithms was functional to two datasets, with a combined total of 63 image pairs. The proposed approach outperforms all other algorithms, in most of the image pairs in the datasets, considering the PSNR and S-CIELAB evaluation metrics. Not only has it obtained some of the best average scores but also shows to be more consistent and robust. Results have shown that the proposed approach achieves very high-quality results even if no color segmentation preprocessing step is used. Results have also improves the effectiveness of the color correction algorithm. Finally, we show that the RGB along with the lαβ color spaces achieve like color correction performances..

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S.RIZWANA completed B.tech in ECE Department from SVIT Engineering college, Anantapur . Pursuing M. Tech in Digital Electronics and Communication Systems in PVKK Institute of Technology, Anantapur.

Mail id: rizwana1509@gmail.com

p-ISSN: 2348-6848
e-ISSN: 2348-795X
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Mr. S.RAGHAVENDRA SWAMI completed B.Tech in ECE Department from GATES Engineering College, Anantapur. Completed Masters in Electronics and Communication Engineering in JNTU Anantapur. Currently working as Associate Professor in Dept of ECE PVKK Institute of Technology ,Anantapur.
Mail id : sreeramraghu@gmail.com

Mr. S.RAVI KUMAR completed B.Tech in ECE Department from G PULLA REDDY Engineering College, Kurnool. Completed Masters in Digital Systems and Computer Electronics in BITS Engineering College, Warangal. Currently working as Associate Professor in Dept of ECE , PVKK Institute of Technology ,Anantapur.
Mail id :ravik.s4u2020@gmail.com