

A Relative Study on Image Blending

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Abstract – Image blending is a process of creating a set of discrete samples of a continuous, one-parameter family of images that links a pair of input images. Image blending has uses in a variety of computer graphics, cartoons and image processing applications. Image blending is to paste a source patch onto a objective image, which has received considerable attention. While gradient-domain blending is dominant. Experiments show that our blending fallouts are visually comparable to gradient-domain methods while possessing real-time performance. This method is applied for image stitching and object elimination. The key contribution of this survey work is studying how applying color and luminance compensation before Poisson blending improves the blending quality and processing speed of Poisson blending in long image sequences where colors and luminance contrast amongst source images, and also improves the quality of image labeling.

Index Terms – Face swapping; multi-scale disintegration; image processing.

1. INTRODUCTION

Image blending is to drag a patch from a source image, and paste it to a objective image while achieving a seamless blending result, which is commonly used in image editing. These approaches first require the user to define the blending regions, and then compute a target field and boundary conditions from these regions, and finally solve the Poisson equation to reconstruct an image. The face swapping between two different images is receiving attention gradually. An effective image blending scheme is needed for the natural image synthesis between two faces. We propose an adaptive weight value based blending method for natural face swapping.

We need to preserve important portions of the human face such as eyes, nose and mouth for the more natural synthesis between objective and reference image. To this end, the face locations of objective and reference image have to be obtained and extracting the synthesis region is needed for proposed blending method. Then, we cover the face region of the objective image with the face region of the reference image. At this step, we use the proposed blending technique to eliminate the rigid boundary line effectively. In

experiment, we verify that the proposed method can naturally synthesize face regions derived from the objective and reference image. Additionally, we confirm that the proposed technique can preserve the important portions of the human face such as eyes, nose and mouth.

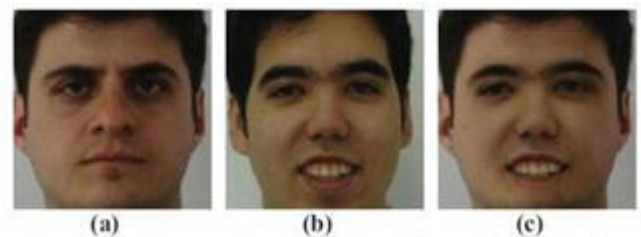


Figure 1 (a) the target image (b) the reference image (c) the result image that has to be blended by proposed method

2. RELATED WORK

Image matting is a common way to extract an object from a source image and paste it naturally onto a objective image using an alpha channel. Most matting procedures require the user to provide a trimap to estimate the alpha channel and foreground color. But drawing an accurate trimap for source patch is time-consuming. There has been a lot of work on natural image matting using a single image [1] [2].

The first area is the development of *image morphing* as a mechanism for computing sets of transition images between two input images. Most of the attention has concentrated on the *warping* of images. Wolberg [3] has written an extensive book on the subject. Beier and Neely [4] describe a complete system with manual correspondences, image warping, and interpolation to accomplish very convincing image morphing. Because of the need to establish a large number of precise correspondences, much attention has been given to the facet of image morphing. Several researchers have proposed

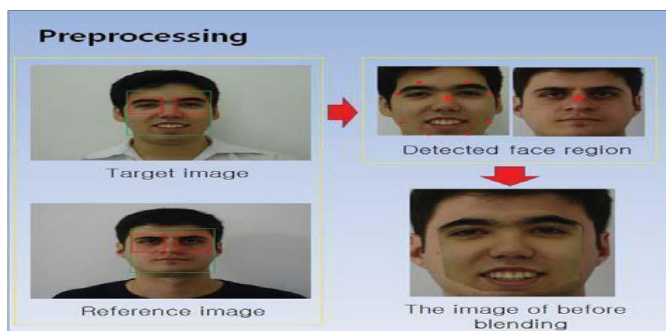
techniques for establishing correspondences between curves [5], [6]. Recent work has addressed the problem of automating image metamorphosis [7], [8] by automatically finding corresponding features in pairs of images (as with fiducials on a human face). In this survey, we progress a fast and high-quality image blending approach based on the work in color correction [9], fast labeling [10], and gradient domain image blending [11] for creating high-quality and high-resolution panoramic images on mobile devices. We focus on integrating the color correction, fast labeling, and Poisson blending processes into a sequential panorama stitching procedure, improving the blending quality and processing speed of Poisson blending with color and luminance compensation in applications of long image sequences with very different colors and luminance between the source images, improving the quality of image labeling with color correction.

3. PROPOSED MODELLING

Our image blending method is a part of real time face replacement system. Therefore, this method must have short computational time. However, many blending methods such as seamless cloning, that proposed by Patrick Perez et al [14], require too many computation although it have a good performance.

2.1 The alpha blending technique

The alpha blending method, proposed by Thomas Porter and Tom Duff [13], is to mix two pixel-values derived from synthesis regions of target image and reference image by a certain ratio. When the weight value of reference image is larger, the reference image is expressed more than target image. When the weight value is extremely high, we can see a rigid boundary between reference image region (inner) and target image (outer) since the same weights are given to all pixels when the skin color and illumination have difference. Therefore, we need an effective blending method that can naturally remove the boundary and well preserve the characteristic of the reference image as much as possible at the same time.



2.2 Preprocessing

We need to extract the synthesis region before to perform the image blending. Firstly, find the face position in the target image and reference image by using the face detection algorithm proposed by Viola and Jones [15]. Secondly, extract the synthesis regions of these face images extracted from the previous step manually.

Lastly, cover the synthesis region of the target image with the synthesis region of the reference image. Moreover, In order to synthesize naturally, the central position between two eyes which are extracted by Viola-Jones detector is needed. After extracting the synthesis region, the color adjustment is needed because of differences of color tone between target and reference image. In this paper we adopt color transfer proposed by E Reinhard et al [12]. Firstly, we need translate the RGB space to lab space. Then, calculate the mean and variance of the reference region are replaced with the mean and variance of the target region. Finally, the result image is re-translated to the RGB space.

2.3 The blending method by adaptive weight

We proposed the method that divides synthesis region into core and general region for clearly express the face of the reference image when put the weight to intensity of pixel of synthesis region. We define a sub-region of synthesis region, which comprises eyes, nose and mouth as the core-region and define the rest as general region. Then, give the maximum weight 1.0 to all pixels on the core region, meanwhile put the adaptive weight to the general region according to the distance. In other words, every pixel of the synthesis region has a agreeing weight. If there is a pixel belonging to the core region, then the pixel can get a weight value 1.0, and if not, it is belonging to the general region, then the pixel can get an adaptive weight value it is determined by the distance from a pixel to the boundary. As the distance d is determined by the minimum value among distances from certain pixel to boundaries of four directions: up, down, left and right.

4. RESULTS AND DISCUSSIONS

In this paper, way of evaluation is in two ways: Firstly, use of extensive data which include different gender, age groups and color of skin to demonstrate the face blending quality. Then, also link with seamless cloning technique [14] in execution speed. This proves that the system is effective and very fast. This system was implemented in Visual C++ and tested on a 2.13 GHz processor. Moreover, use of OpenCV library as well and the reference distance ld can be obtained through dividing the minimum value between width and height of synthesis region by 5. Here, the blend target image with reference image and to get the satisfactory result image through this technique. Finally, compared the execution speed of this method with the seamless cloning method [14]. For these, we need select a high resolution image which contains human face, priority. Then, get different resolution images which are obtained by down-sampling. Next, we perform our method and the method of Ref. [14], respectively. Finally, the computational time for each method was measured. The proposed technique is faster than Ref. [14].

4. CONCLUSION

In this survey, an effective blending method by using adaptive weight value for normal face swapping is proposed. In testing, the reference image naturally synthesized with objective image and could preserve the significant parts such as eyes, nose and mouth. Naturally we approve the proposed technique removes the rigid boundary. The approach integrates color correction, fast labeling, and gradient domain image blending into a sequential panorama stitching procedure for creating panoramic images on systems with limited memory resources. It uses color and luminance compensation to improve the blending quality and condense computational iterations of Poisson blending and to improve the quality of optimal seam finding.

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