Original research article

Digital makeup from Internet images

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ABSTRACT

We present a novel approach of creating face makeup upon a face image with another images as the style examples. Our approach is analogous to physical makeup, as we modify the color and skin details while preserving the face structure. More precisely, we extract image foregrounds from both subject and multiple example images. Then by using image matting algorithms, the system extracts the semantic information such as faces, lips, teeth, eyes and eyebrows, from the extracted foregrounds of both subject and multiple example images. And, then the makeup style is transferred between the corresponding parts with the same semantic information. Next, we get the face makeup transferred result by seamlessly compositing different parts together using alpha blending. In the final step, we present an efficient method of makeup consistency to optimize the color of a collection of images. The main advantage of our method over existing techniques is that it does not need face matching, as one could use more than one example images. Because one example image does not fulfill the complete requirements of a user. Our algorithm is not restricted to head shot images as we can also change the makeup style in the wild. Moreover, our algorithm does not require to choose the same pose and image size between subject and example images. The experiment results demonstrate the effectiveness of the proposed method in faithfully transferring makeup.

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1. Introduction

It has always been of special interest to humans to improve looks which can be misleading sometimes. There are increasingly many commercial facial makeup systems in the market, as makeup makes an individual more attractive and beautiful. Face makeup can be described as a technique to change an individual's appearance by using special cosmetics such as lipstick, foundation, powders, creams etc. It is commonly used among females to enhance attraction in their natural appearances. The foundation and loose powder are commonly used to change the texture of face's skin, while applying makeup physically. The first step is usually to use the foundation to conceal flaws and cover the original skin texture, and then loose powder is mainly used to introduce new, usually eye-catching and pleasant textures to skin. The application of other makeup constitutes like rouge, eye liner and shadow, etc., follow on top layer of the powder. Nevertheless, color makeup transfer is still a challenging task as almost all of the existing techniques undergo with a number of technical and computational disadvantages. Thus it has been a contemporary focus of research to successfully transfer the color makeup in digital images.

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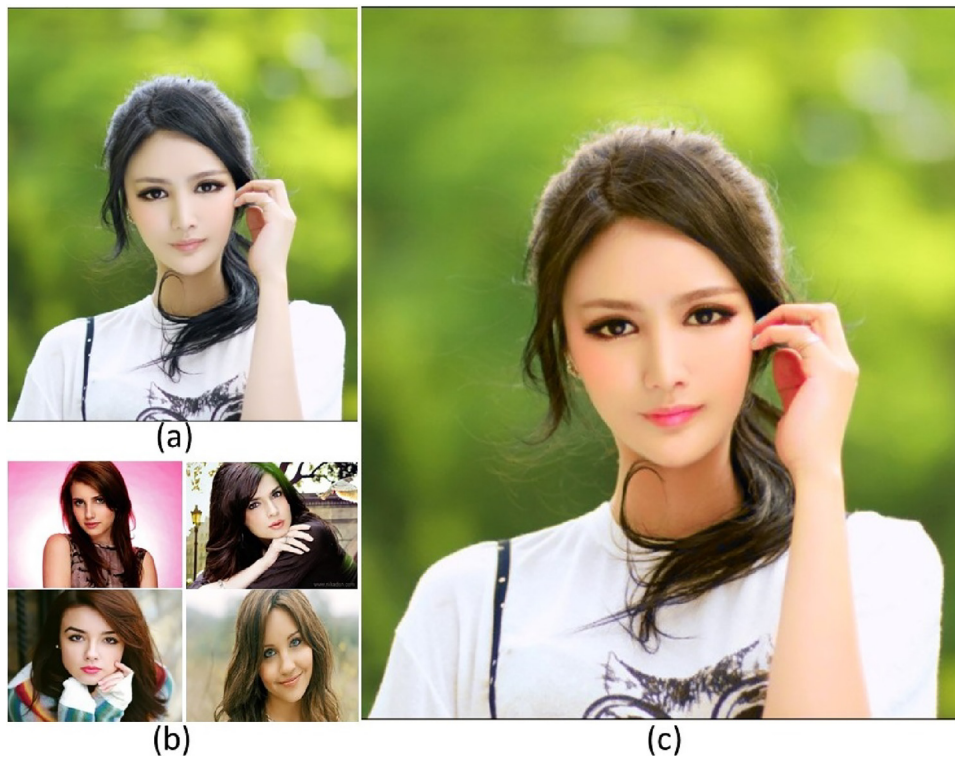*E-mail addresses:* asad@mail.ustc.edu.cn, asadustc@gmail.com (A. Khan).

Fig. 1. Digital makeup from internet images. (a) A subject image, taken by a common user. (b) Example style images, download from Internet. (c) The result of our approach, where foundation effect, eye style, eyebrow style, hair style, skin style and lip highlight in (b) are successfully transferred to (a).

After entering in a beauty salon, the customer usually selects an artistic example image from an available catalog of example images and tells the makeup artist to apply the same makeup on her. It would be more convenient for the user to select more than one example images of her choices from the examples catalog as it would allow her to choose different parts of the face from different example images. Before actually applying the selected task, it would be quit helpful if she is able to preview the same makeup style to her own face. However, it is much time-consuming. Occasionally, the customer has two choices for trying out makeup, of which one is to try the makeup physically which is much time-consuming and requires the customer to be patient. One of the possible way is to try the makeup digitally by ways of digital photography by using different photo editing environments, such as Adobe Photoshop TM [1]. Besides, an online commercial software, Taaz [3], provides users with virtual makeup on face photos by simulating the effects of specified cosmetics. But then using such type of method is usually tedious and relies heavily on the personal expertise and efforts of the user.

This paper deals with the problem of creating makeup upon a face image (Fig. 1(a))with the prototype of multiple images (Fig. 1(b))as the style examples. This is very practical while applying it in the scenario of the beauty salon.

Our approach is inspired by the process of physical makeup. We present an approach of creating makeup upon a face image with the prototype of another image as the style example. In transferring face makeup between images, we have the following challenges. First, such a technique must maintain the correspondences between meaningful image regions in an automatic way. Secondly, for novice users, the pipeline should be intuitive and user friendly. Thirdly, an efficient technique to optimize makeup consistency of a collection of images depicting a common scene. The generation of automatic Trimap is another challenge as almost all of the existing techniques require a user to input a Trimap manually.

We propose an approach which transfers the face makeup from internet images of different types taken by professional artists while taking advantage of high level semantic information. Our method can be applied by user to retouch his photo to acquire an exquisite visual style image. In addition, we present an approach based on matrix factorization to optimize consistency for multiple images. In order to achieve such a goal, we use sparse correspondence obtained from multi image sparse local feature matching.

In short summary, this article makes the following contributions:

- a new face makeup transferring technique is presented which can transfer makeup between different regions of the subject image and multiple example images with the same facial semantic information,
- we propose a new algorithm of automatic generation of Trimap for efficient synthesis of each facial semantic information,
- a semantic style transfer technique which transfers the makeup and automatically optimize the makeup consistency.