Photorealistic Facial Image from Monochrome Pencil Sketch

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(a) (b) (c)

Figure 1: *(a) Input image (pencil sketch), (b) Output image (20 year old database), (c) Output image (60 year old database)*

1. Introduction

People often draw the rough portrait using only a pencil. However, it is difficult for viewers to imagine an actual face from monochrome sketch. If photorealistic facial image can be generated from pencil sketch, it is very useful. Additionally, this system will be applicable to criminal investigation, because the police often draw the portrait using only a pencil based on the testimony of an eyewitness.

Many studies on sketch-based images have been reported.

Klare et al. [2011] proposed a matching system between a forensic sketch and a gallery of mug shot images. However, in their method, it cannot generate an original face.

In this paper, we can generate an original facial image which preserves individuality of an input image. In brief, we propose a method that can generate a photorealistic facial image from monochrome pencil sketch.

2. Proposed System

In our method, an input image is monochrome pencil sketch. As a database, we use 1000 facial images. Our system is implemented in 4 following steps.

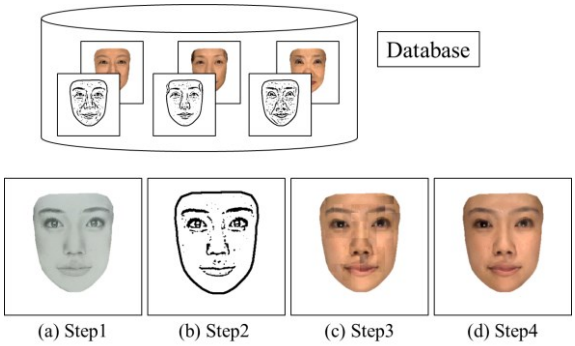

Figure 2

2.1 Normalize the images to the average geometry

First, we normalize both an input image and images in the database to the average geometry. (Figure 2(a))

2.2 Apply adaptive binarization to the every image

Adaptive binarization is binarized with each threshold for each block. These thresholds are determined for each block, and its value is the average of the luminance value. By performing adaptive binarization, we obtain a binarized image, which clearly represents a slight local difference of the luminance in detail rather than the global distribution of the luminance. (Figure 2(b))

2.3 Replace input patches with database patches

We divide every image into small square patches and replace the input patches with patches in the database. The most similar patches are selected from the database. The similarity is calculated by pixel to pixel comparison of the database's binarized images and the input image. Then, the number of pixels with equal binarized values between the database and input images is counted. (Figure 2(c))

2.4 Smooth boundary between adjacent patches

Now, there are skin color differences between adjacent patches. Using the seamless cloning method proposed by Perez et al. [2003], we remove the boundary while maintaining impression on an image. In this paper, we adapted their method to each patches.

Finally, we normalized an image to the original geometry. (Figure 2(d))

3. Result and Conclusion

As shown in Figure 1(a) and 1(b), the results show that our method can generate photorealistic facial images that are similar to input images.

Moreover, if we use database of 60 year old, an output image looks older, as shown in Figure 1(c).

References

KLARE, B., LI, Z., AND JAIN, A. 2011. Matching Forensic Sketches to Mug Shot Photos. In *IEEE Transactions on Pattern Analysis and Machine Intelligence.* vol. 33, IEEE, 639-646

PEREZ, P., GANGNET, M., AND BLAKE, A. 2003. Poisson Image Editing. In *Transactions on Graphics (Proceedings of SIGGRAPH 2003)*, vol. 22, ACM, 313-318.

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