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Creating a Realistic Face Image from a Cartoon Character

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Abstract

We propose a method of creating a realistic face image from a 2D non-realistic character such as a cartoon. Our system allows us to create a high quality face image that is applicable for some application such as 3D character animation. Our system uses two key algorithms; one is an algorithm for synthesizing a novel face image without the warping process, and the other is a searching algorithm, which search each optimal patch from the database based on gradient distribution.

Categories and Subject Descriptors (according to ACM CCS): I.3.3 [Computer Graphics]: Picture/Image Generation—Line and curve generation

1. Introduction

There are a lot of live-action film from comics or animation. Therefore, creating a natural character from non-realistic character is effective measures for supporting live-action film. In this paper, we create a realistic face image with the synthesis of corresponded database (photographs) patches such as Viso-lization [MPK09]. However, the patch-based techniques require the warping process for normalizing face image. The warping process is a critical issue, because this cannot preserve shape and shade of the input. Additionally, it is difficult to determine optimal patches an input character and the database. To solve these problems, we propose an algorithm for synthesizing a face image without the warping process, and a searching algorithm based on gradient distribution. As a result, we can synthesize a natural face image which preserves the original features and can reconstruct 3D facial model automatically.

2. Proposed System

We divide the input facial image (2D character) into patches, and obtain the most optimal patches from the database on the synthesis. At first, we compute a transformation matrix using an input image mesh model which is constructed by the Delaunay triangulation based on facial feature points and database images mesh models which are same division the input mesh model. Figure 1 is the image of calculating correspondence point. Let $\vec{v}_p, \vec{v}_{p'}, \vec{v}_i$ and $\vec{v}'_i, i \in \{1,2,3\}$, is the triangle vertices of searching point, corresponding point of p, 2D input landmarks and database respectively. We rewrite the vectors of the triangle in matrix form treating as columns $V = \{\vec{v}_2 - \vec{v}_1, \vec{v}_3 - \vec{v}_1\}$, $V' = \{\vec{v}'_2 - \vec{v}'_1, \vec{v}'_3 - \vec{v}'_1\}$, and $\vec{v}'_p$ is calculated by $\vec{v}'_p = V'V^{-1}(\vec{v}_p - \vec{v}_1) + \vec{v}'_1$. After calculating corresponded points, we search an optimal patch based on gradient distribution of a patch and synthesize patches. Specifically, we match average luminance values between input and database patches.

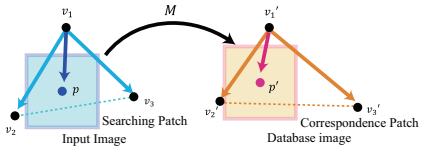

Figure 1: *Correspondence between input and database.*

Figure 2: *an example of our result; (a)input image, (b)synthesized image, and (c)3D reconstruction result.*

3. Result and Conclusion

Figure 2 is shown an example of our result using 24 photographs database. As a result, we can synthesize a lifelike face image. In addition, our result allows us to generate 3D facial model using blanz's technique [BV99].

References

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