Creating a Realistic Face Image from a Cartoon Character

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Introduction

➢ Goal

To generate a realistic facial image from a single cartoon character image.

➢ Key Idea

✓ an algorithm for synthesizing a novel face image without the warping process.

✓ a searching algorithm, which search each optimal patch from the database based on gradient distribution.

Result

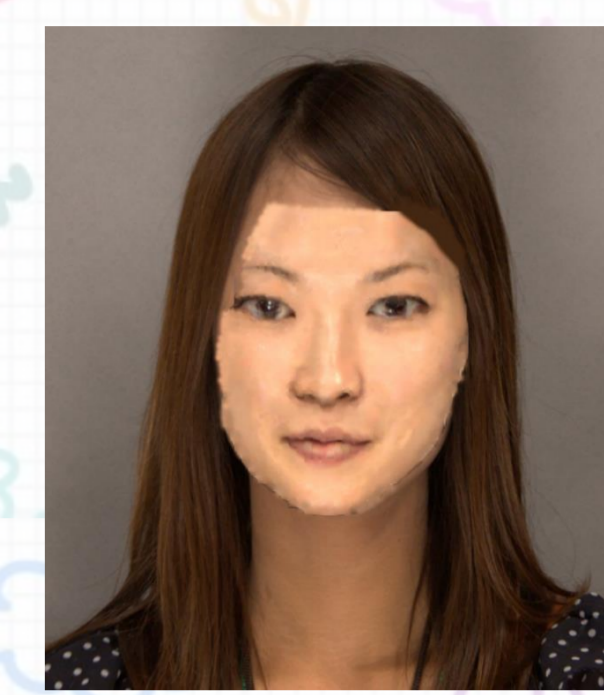Patch size : 8×8 [Pixel], Database : 42 photographs

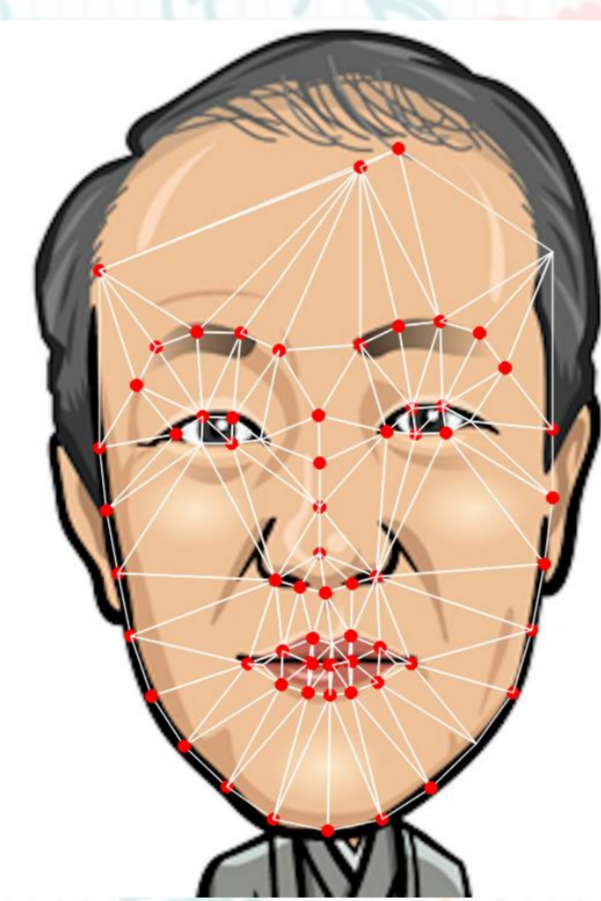Input   Our Result   Mohammed et al.[2009]

Input   Output
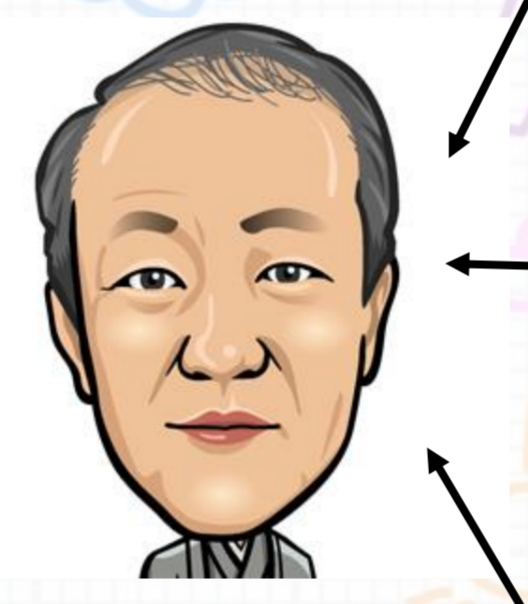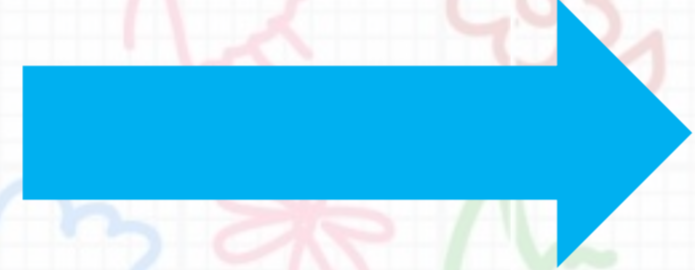
Proposed System

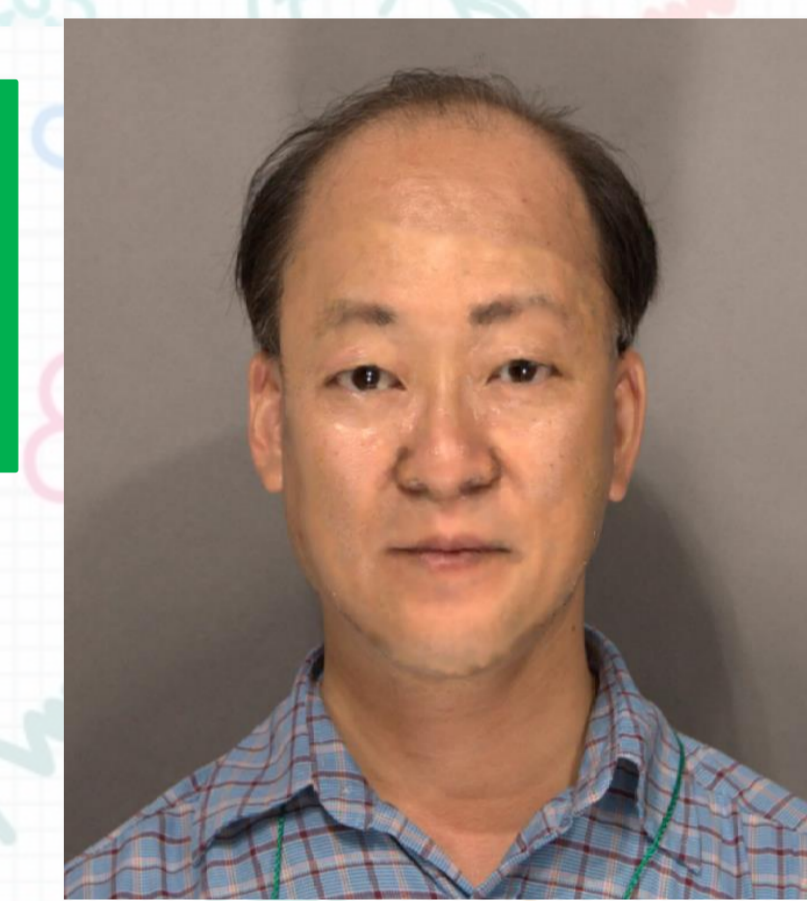### Overview of our system

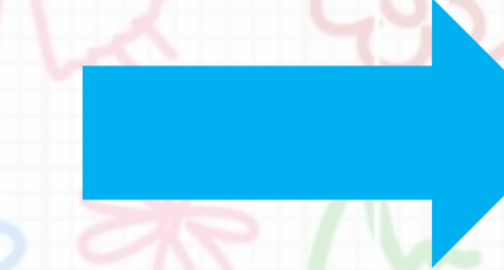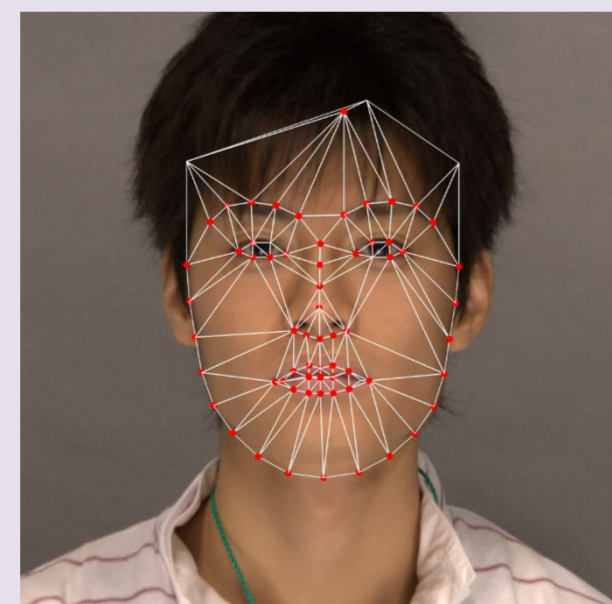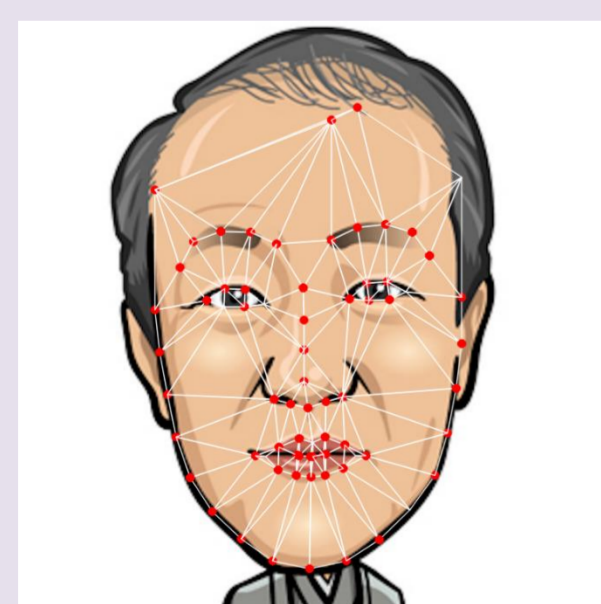Input   Making mesh model   Position correspondence   DB   Texture Synthesis   Output

Making mesh model

I. Detection of input facial feature points Ex) eyes, mouth, face edge, etc…

II. Divide the input using the Delaunay triangulation based on facial feature points

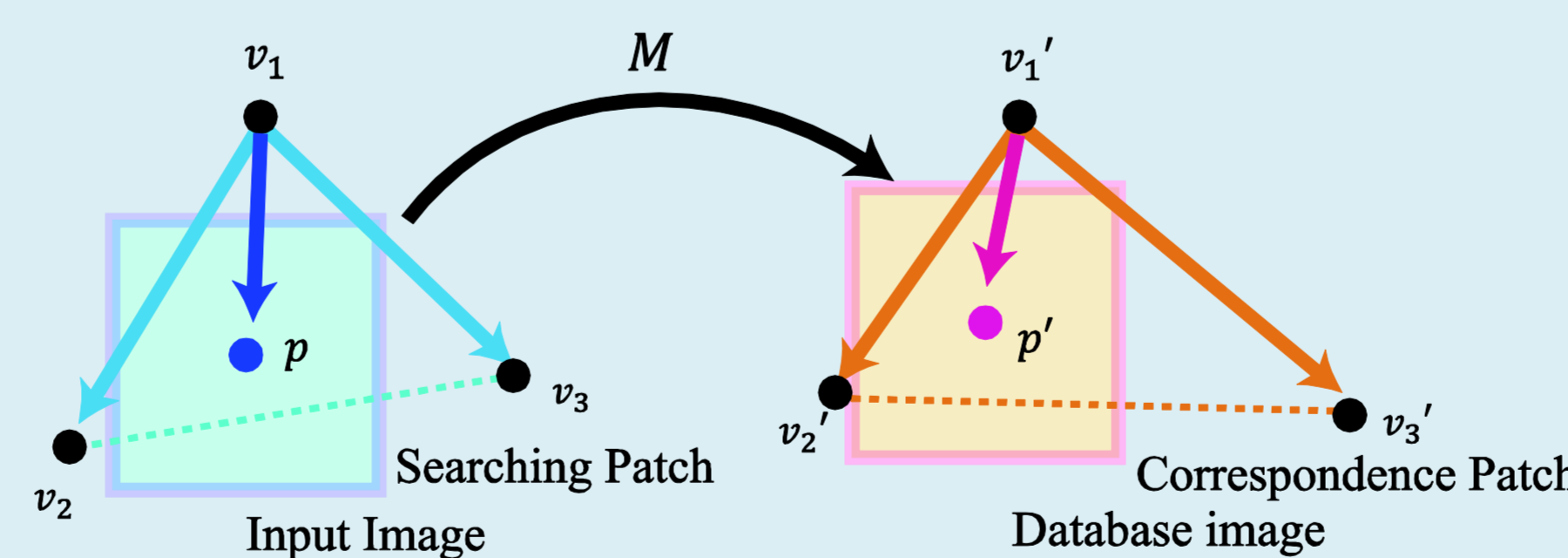III. Divide the database images which is same of input mesh (step Ⅱ).

Position correspondence

◆ Calculate correspondence points between an input and database using transformation matrix M .

$$\vec{v}_{p'} = V' \cdot \vec{M} + \vec{v_1}$$

$$s.t.\ \vec{M} = V^{-1} \cdot (\vec{v_p} + \vec{v_1})$$

$$V = \{\vec{v_2} - \vec{v_1}, \vec{v_3} - \vec{v_1}\} \quad V' = \{\vec{v'_2} - \vec{v'_1}, \vec{v'_3} - \vec{v'_1}\}$$

Searching Patch
Input Image

Correspondence Patch
Database image

Texture Synthesis

◆ Searching an optimal patch based on gradient distribution.

➢ match average luminance values between input and database patches.

$$\arg \min_{i \subset \{1 \dots N\}} \sum_{(x,y) \in patch} \left\| L_P(p) - L_{DB_i}(p') \right\|^2$$

L_p : luminance value of input patch

L_{DB} : luminance value of database patch

i : the number of database

N : total number of database

Application

◆ Our result is applicable for generating 3D facial character model.

Conclusion & Future work

➢ Conclusion

- we propose a method of creating a novel facial image which is preserved original image.

➢ Future Work

- to extend our techniques to the hair region.