Experimentation on Digital Transfer of Makeup by Example

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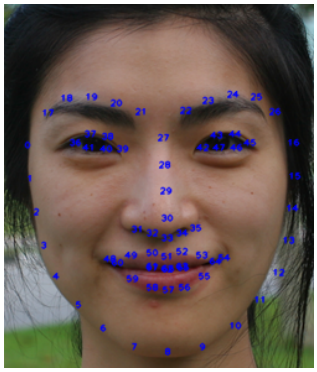
INTRODUCTION:
In this report we have shown all the intermediary results during the development towards the final required output. We have also considered a few different types of images. We have also considered the variations in the results obtained by varying some parameters.

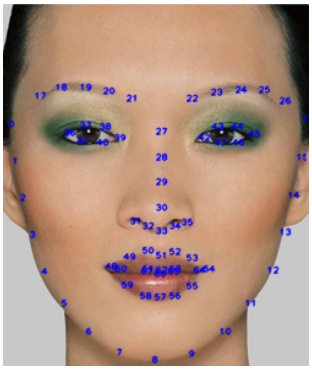
RESULTS:
The following are the results on various sets of images. The pipeline used is same for all the cases so it is desrcribed only for the 1st case and it is assumed to be the same for all the other cases unless mentioned otherwise.

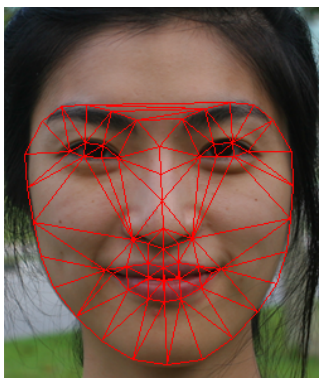
Image Set – 1

The image on the left is the subject image to which we will transfer makeup. The image on the right is the example image from which we will take the makeup.

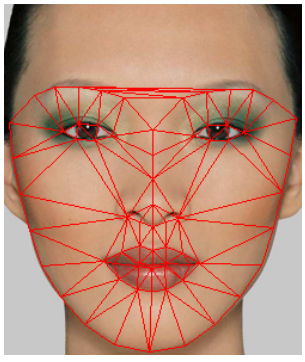


Control Points of Images





Delaunay Triangles of Images



Skin detail of Subject

of Example

weighted addition of both **(d = 1)**

Note: Our skin detail layers seem to differ from the ones given in the paper because of some coding decisions we made early into the assignment. Changing the data type of the skin detail image caused such a black and white result on printing. It however has no effect on the final output.

a* and b* layers – subject

a* and b* layers – example

a* and b* layers – result. Obtained by alpha blending (**r =0.8)**



Structure layer of subject of example of the result

The structure layer of the result is obtained by using gradient editing on the structure layers of the subject and example layers.


Image – A Image – B

PIPELINE:

1. Control Points and Delaunay Triangles are found for both the example and subject images

2. Using these points the example face is warped to face of the subject. Henceforth all references to example refer to this warped example.

3. The RGB images are converted to their La*b* equivalents. A bilateral filter is applied on the L layer. The resulting image is the structure layer

4. The structure layer is subtracted from the L layer to give the skin detail layer.

5. The a* and b* layers are the color layers.

6. A weighted addition is done on the skin detail layers to obtain the final skin detail layer. Here we introduce a parameter, weight, denoted by **d,** the weight of the example in the addition.

7. The color layers are alpha blended to get the final color layer. Here we introduce another parameter **r**.

8. Gradient editing is done on the face structure layers.

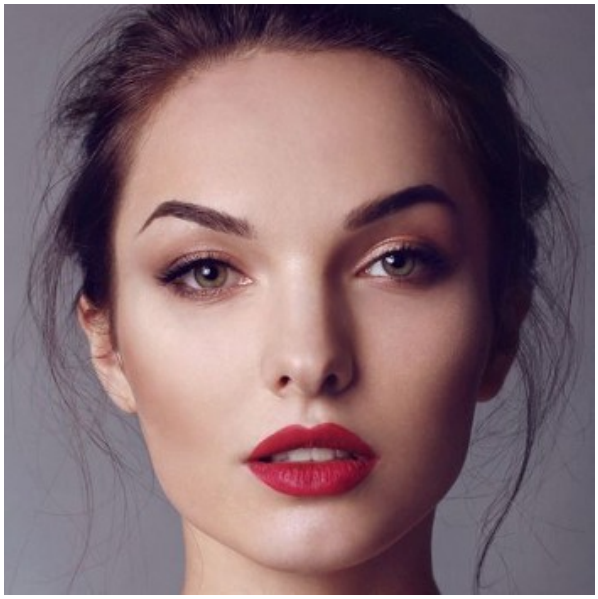
9. Lips have been treated in 2 different ways and the description is given in detail after this.

10. Using the resulting layers obtained a L*a*b image is reconstructed and then it is converted to RGB which is our final output.

These 2 images are the 2 final outputs obtained after combining the 3 layers obtained individually. Namely the skin detail, face structure and color layers. The difference between the 2 is however the way in which the lip makeup is transferred. After the steps described initially there is another extra step to transfer lip makeup which is described in the paper. Using that we get Image – A.

However, since our implementation of that algorithm took almost 4 mins to execute fully, we also wrote another function which tried to capture the essence but reduced the computation significantly.
Since in the paper the formula given tried to capture the color of the example for the lips but retain the texture of the subject, we in our shortcut method added the color layer and structure layer of the example image to the detail layer of the subject layer. This is essentially because the detail layer consists of the finer texture details and the structure and color layer encapsulate the base features.

Image Set – 2



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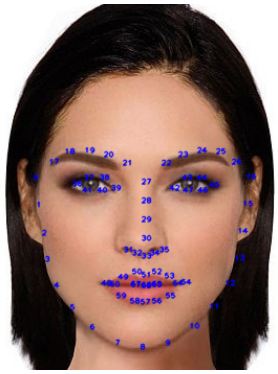
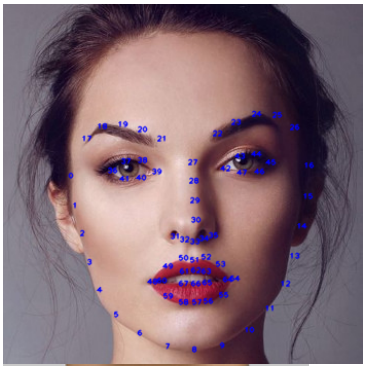
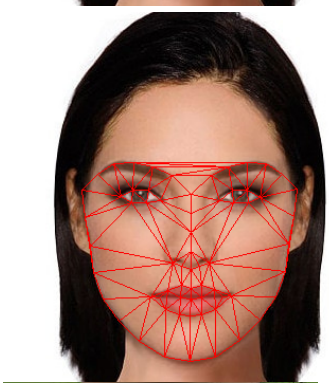
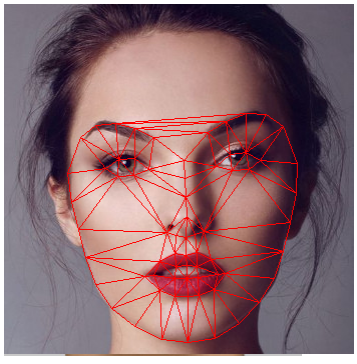


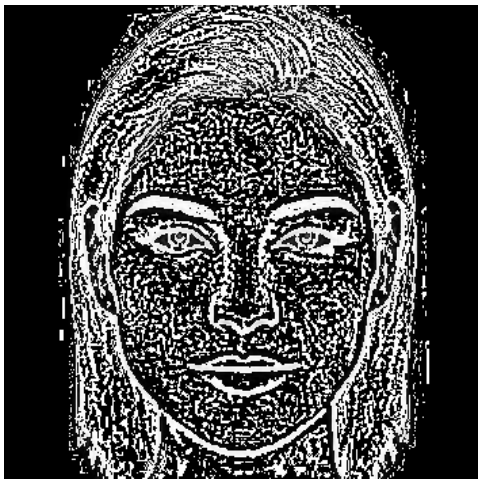
Control Points of Images





Delaunay Triangles of Images



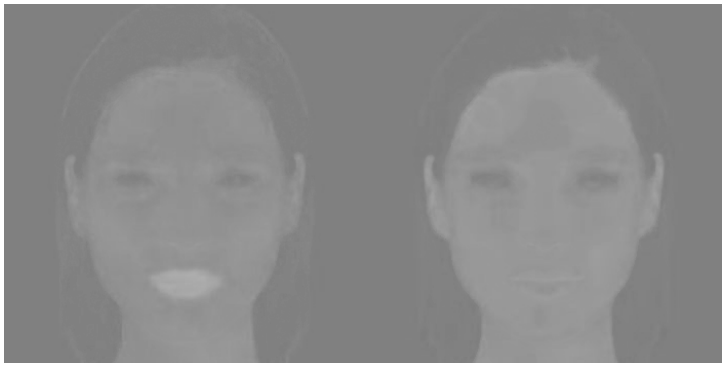


Skin detail of Subject

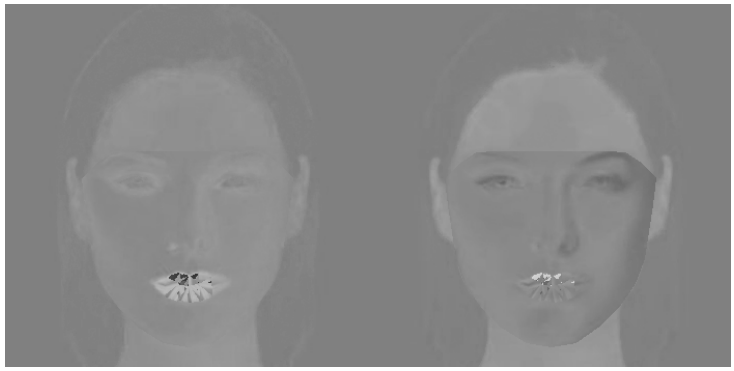
of Example

weighted addition of both **(d = 1)**

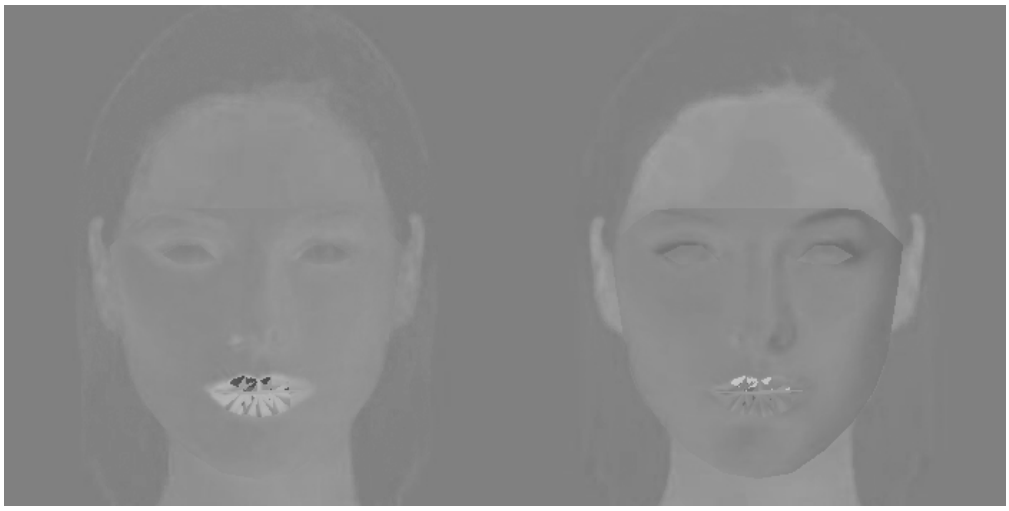
Note: Our skin detail layers seem to differ from the ones given in the paper because of some coding decisions we made early into the assignment. Changing the data type of the skin detail image caused such a black and white result on printing. It however has no effect on the final output.



a* and b* layers – subject



a* and b* layers – example



a* and b* layers – result. Obtained by alpha blending (**r =0.8)**

Structure layer of subject

of example

of the result

The structure layer of the result is obtained by using gradient editing on the structure layers of the subject and example layers.

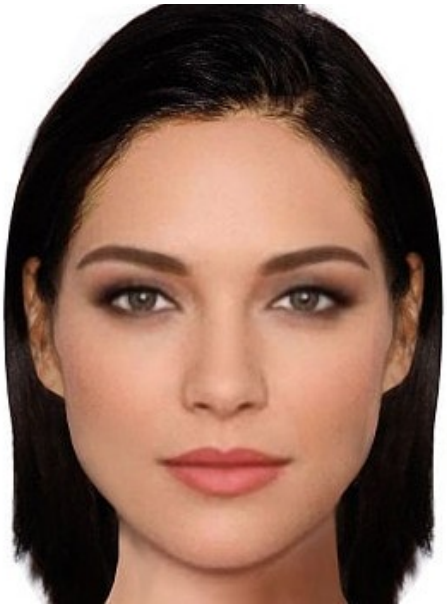
Image – A

Image – B

In this case the shortcut method implemented for the lips performs almost as good as the actual method mentioned in the paper.

Note: The jagged edges that appear on the lips occur due to wrong active point correspondence. The points are very close to each other and hence they are slightly mismapped resulting in these jagged edges.

Image Set – 3



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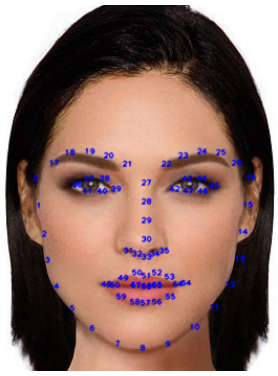
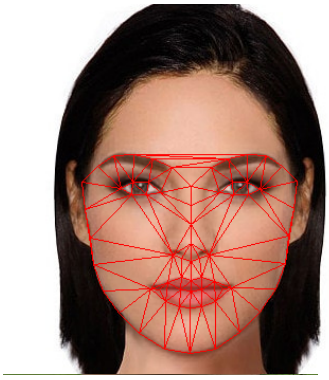


Control Points of Images



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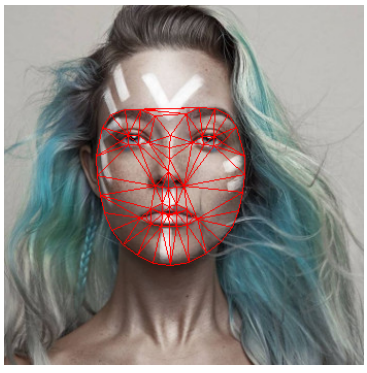
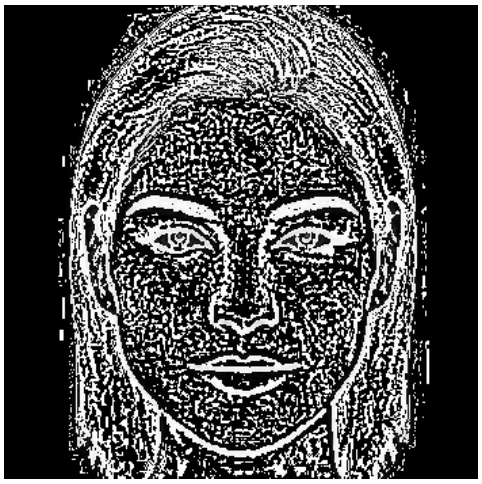
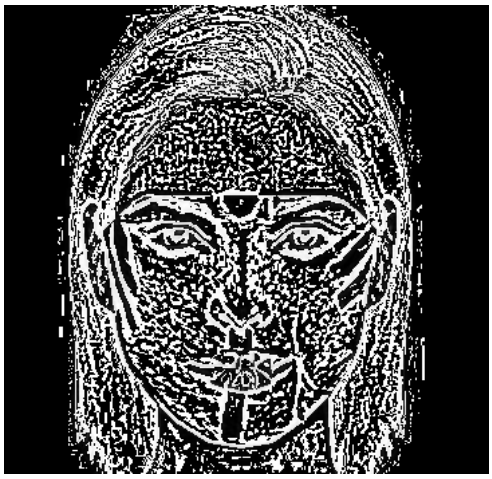
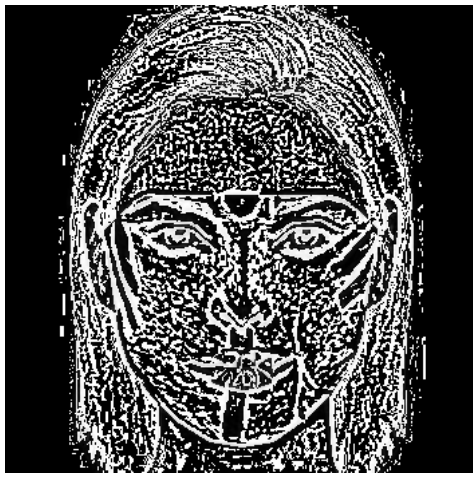




Skin detail of Subject



of Example



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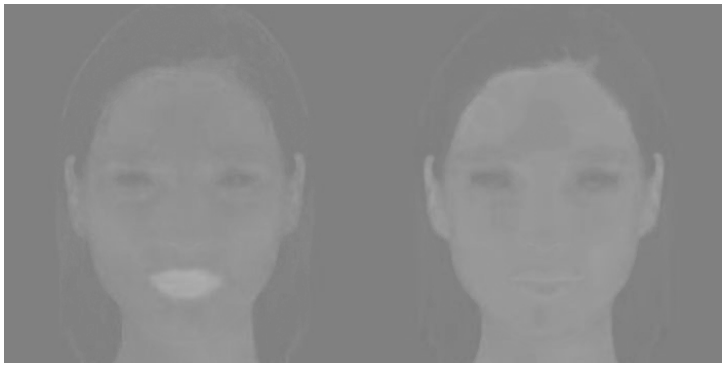

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a* and b* layers – example

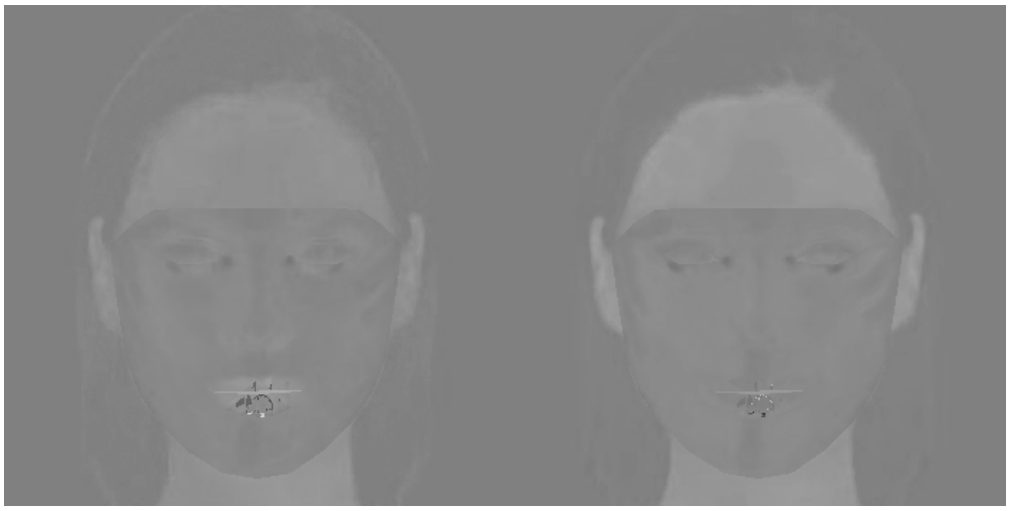

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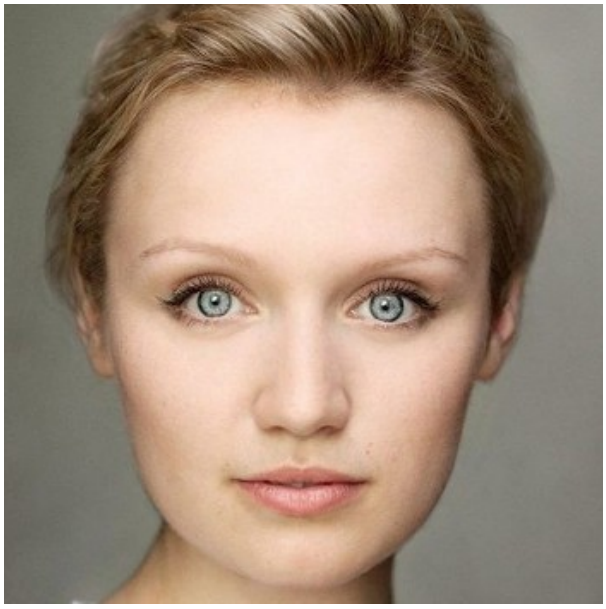
Image Set – 4



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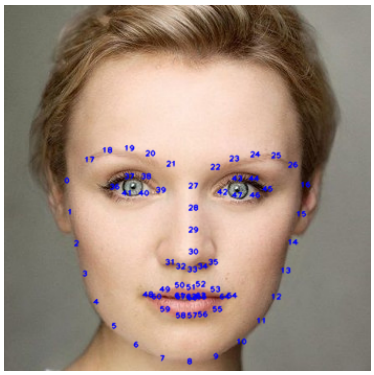
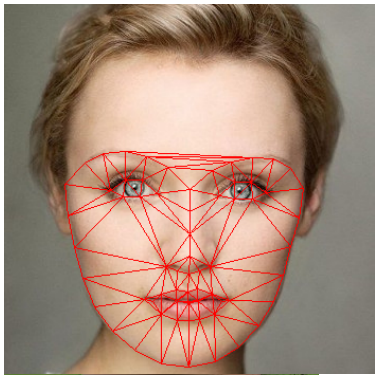


Control Points of Images



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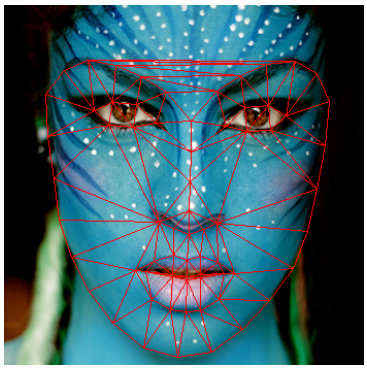

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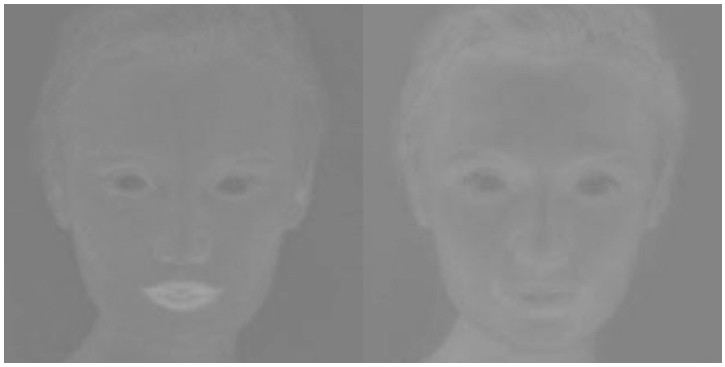

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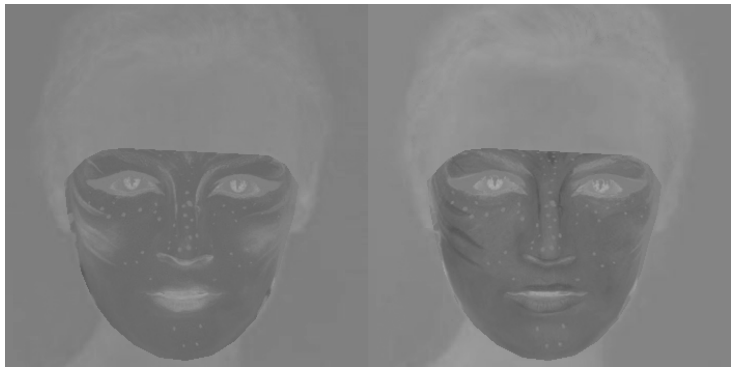
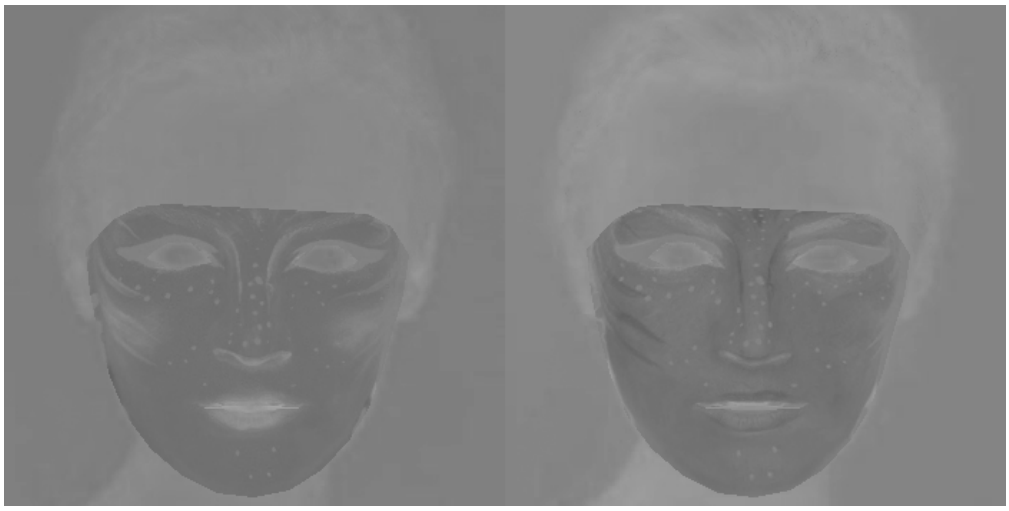


a* and b* layers – example



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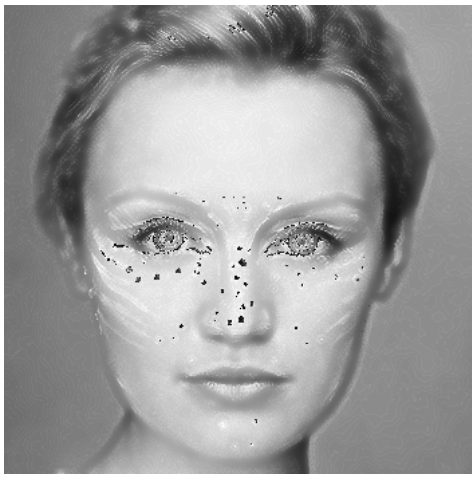

Structure layer of subject of example of the result

The structure layer of the result is obtained by using gradient editing on the structure layers of the subject and example layers.

Image – A

Image – B

In this case the shortcut method implemented for the lips performs almost as good as the actual method mentioned in the paper.

Note: Jagged edges dont appear here because the points are properly mapped on the lips. The dots on the face are a result of the dots on the example image.